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Medical Handbook for Seafarers

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Contents

I Emergency first aid	7
1 First aid of vital functions	8
2 Foreign object in respiratory tract	14
3 Stopping major bleeding	15
4 Shock.....	16
5 Classification of patients according to treatment requirement	19
II Accident injuries and their treatment	21
6 Skull injuries and cerebral haemorrhage	22
7 Injuries to the eye	24
8 Injuries to the abdominal area.....	28
9 Bone, joint and muscle injuries.....	30
10 Amputation.....	35
11 Burns and frost injuries.....	36
12 Heat-induced illnesses.....	38
13 Electrocution.....	40
14 Thermoregulation of organs and hypothermia	41
15 Near drowning	44
16 Poisoning.....	45
III Symptoms and diseases and their treatment	51
17 Headache, and pain in the head region	52
18 Vertigo.....	55
19 Alteration of consciousness and seizures.....	56
20 Eye problems and symptoms	60
21 Illnesses of the ear and the throat.....	62
22 Problems of the mouth and the teeth	65
23 Chest pain and cardiovascular diseases.....	66
24 Difficulty in breathing	70
25 Diseases of the airways.....	72
26 Vomiting, fever and diarrhoea.....	75
27 Constipation and haemorrhoids	78
28 Abdominal pain	79
29 Obstetrics and gynaecological disorders	84
30 Symptoms of the lower abdomen and acute diseases of the urinary organs	90
31 Sexually transmitted diseases (STD)	93
32 Dry and itchy skin	97
33 Rash.....	98
34 Protective gloves and protective skin ointments	106
35 Joint and muscle pain.....	107

36	Mental disorders	109
37	Alcohol and drugs	113
38	Infectious and contagious diseases	118
39	Diabetes	122
IV Treatment procedures		125
40	Securing the airways, intubation	126
41	Measuring the blood sugar	131
42	The drugs in the ship's pharmacy and their use	133
43	Drug injections	135
44	Drug treatment of the eyes	137
45	Intravenous (IV) infusion therapy	139
46	Measuring blood pressure	143
47	Wounds	144
48	Retention of urine and catheterization of urinary bladder	152
49	Positioning, moving, and evacuating a patient	153
50	Cleaning hands and instruments	156
V Self-protection		159
51	Self-protection and prevention of infections	160
52	Vaccinations for seafarers	161
53	Death on board	162
VI Advice and instructions		165
54	Radio Medical	166
55	Confidentiality and seafarers' health care	168
VII Structure and functions of the human body, examination and recording the information		171
56	Structure and functions of the human body	172
57	Examining the patient	181
VIII Forms		193
58	Patient information	194
59	Treatment on board	204
60	Patient follow-up form	205
The drugs mentioned in the book; concentrations, drug forms and treatment equipment		206
Index		210

FOREWORD

When a vessel is at sea, it is often difficult or even impossible to get a doctor on board or to transport the ill or injured patient ashore. The success of the treatment depends on the medical know-how and treatment facilities on board.

The captain of the ship is officially responsible for the treatment given on board. In practice, the person in charge is the captain himself or a person appointed by him. International and national regulations and instructions determine the crew's level of medical training (e.g. STCW-95). In addition, the ship has a medical chest and the necessary medical equipment.

The international Radio Medical system was developed to compensate for the lack of well-trained medical staff on board. Via the service system of Radio Medical, a doctor on shore can be consulted free of charge. Improved telecommunication systems have facilitated direct contact between the crew and the shipping company's occupational health service or, for example, a designated health care facility.

It is crucial that the person in charge of treatment on board is capable of recognizing the patient's symptoms and of following the patient's condition. Without these skills, describing the patient's condition to Radio Medical's doctor on land will not be successful.

The Radio Medical system has been used in seafaring already for a hundred years. Video transmission, made possible by modern telecommunications technology, is not expected to significantly change the basic situation of on-board treatment. All the treatment given on board depends first and foremost on the know-how of the crew members. The equipment on board and even the finest communication technology are only complementary.

The objective of this manual, together with the possible medical consultation via Radio Medical, is to help the person in charge of treatment on board to be able, on the basis of the symptoms and findings, to choose the optimal treatment. Unlike earlier manuals on medical treatment at sea, this book contains relatively little background and theoretical information about illnesses, as such information is already available in many medical handbooks and on the internet. There are also guide books on the dosage and side-effects of drugs, thus this information is not repeated here.

The treatment instructions are in line with the contents of the ship's medical chest. The drugs are referred to by their official, i.e. generic names, so that the guide can be used in all countries. The number/letter combination appearing after the drug (e.g. 6/D) refers to the drug list at the end of the book. The list of drugs fulfils the demands laid down by the EU Council Directive 92/29/EEC.

In the preparation of this book, an attempt has been made to take into account the actual examination and treatment facilities on board ship. That is why the treatment procedures may differ from those carried out on land. The book is targeted at healthy, working-aged seafarers employed on ships. The treatment of children or elderly people is thus not dealt with in this book.

The book can also be used when giving ship crews the required basic or advanced training in drug administration.

The International Maritime Organisation's (IMO) 'Medical First Aid Guide for Use in Accidents involving Dangerous Goods' (MFAG) is not included in this book, because it is already to be found on every ship. The same applies to the international forms that are used when consulting a doctor via Radio Medical or by the satellite system.

Because the book will probably be read on a chapter here and a chapter there basis, depending on the patient and the situation at hand, certain points have been repeated deliberately. It is essential that the ships' crew can use it without having to read it from beginning to end.

Expert consultants and commentators on the book have been Ari-Pekka Aarnio, Ritva Borman, Eeva Ekholm, Harri Kankare, Kari Koskela, Leena Niemi, Sinikka Niemi, Petri Nieminen, Erkki Nylamo, Tuula Oksanen, Katja Paakkola, Lassi Pakkala, Kari Riutta, Heikki Saarni, Ulla-Maija Saarni, Heikki Suoyrjö and Erkki Säkö. They represent different medical fields and have taught seafarers for a long time. The Health Division of the Advisory Board for Maritime Affairs has offered their comments and has sponsored the editing of the book.

Turku, Finland, 2007

The Editors

Heikki Saarni and Leena Niemi

EMERGENCY FIRST AID

- 1 First aid of vital functions
- 2 Foreign object in respiratory tract
- 3 Stopping major bleeding
- 4 Shock
- 5 Classification of patients according to treatment requirement

1 First aid of vital functions

Emergency first aid is immediate first aid with the aim of saving the patient's life. The victim's breathing and blood circulation are secured with emergency first aid. Emergency first aid must be given without delay, because the first few minutes are crucial for the patient's survival. Thus, emergency first aid must be started immediately at the scene. The first aid procedures are the same in the case of an accident and an attack of illness.

Emergency first aid procedures consist of the following: assessment of the situation and rescuing the victim from danger, securing breathing, securing circulation, stopping bleeding and treatment of shock. When the situation has been stabilized, the actual treatment and the possible transportation of the patient to shore for further treatment can be started. On arrival at the scene, a rapid evaluation of what has happened must be made. If the

1. Assessment of the situation	What has happened Safety hazards at the scene (electrocution, fire, gases)
2. Protect yourself from danger and save the patient	Use protective clothing or other safety equipment Eliminate safety hazards (e.g., switch off electric current, air the room)
3. Assess the condition of the patient	
3.1. Patient is breathing	Make sure that respiratory tract stays open
3.2. Patient is not breathing	Open respiratory tract <ul style="list-style-type: none"> • remove any foreign objects • tilt head backwards Start cardiac massage <ul style="list-style-type: none"> • press 30 times Start mouth-to-mouth respiration <ul style="list-style-type: none"> • blow twice, check that the patient's chest rises • if the chest does not rise, check the position of the head Check the pulse or signs of circulation; if there are none, continue resuscitation <ul style="list-style-type: none"> • rhythm of resuscitation: press 30 times, blow twice
4. Patient is bleeding	Stop bleeding <ul style="list-style-type: none"> • raise the limb • press the wound with hands using dressings • if necessary, bind the wound with a pressure bandage
5. Patient is in shock	Determine the cause of shock <ul style="list-style-type: none"> • bleeding • allergy
5.1. Shock caused by bleeding	Place the patient on his/her back, elevate lower limbs Start intravenous infusion
5.2. Allergic shock	Administer adrenaline (1 mg/ml) 0.5–1.0 ml

dangerous situation continues, the patient must be rescued from it. The helper must at all times make sure that he/she is not in danger him/herself (electric shock, gas, fire, etc.).

First aid administration must be started immediately when it is safe to do so. The patient's own breathing is assessed and mouth-to-mouth respiration started, if necessary. If the patient's heart is not beating, cardiac massage is started.

A breathing patient is placed on his/her back, and an unconscious patient on his/her side. It must be ensured that the lungs are getting oxygen, the respiratory tract is open and the pulse can be felt. External bleeding must be stopped.

When the patient is no longer in imminent danger, he/she is examined more carefully, his/her wounds are bound more carefully, and fractures are supported. The patient is protected and settled as comfortably as possible. Any necessary further medical treatment is initiated, and the patient's condition is monitored constantly, and, if necessary, his/her transportation to shore is arranged.

1 Resuscitation

Respiratory arrest may be caused by a foreign object in the respiratory tract, drowning, poisoning, electric shock, paralysis, epiglottal inflammation, or injury blocking the respiratory tract. When a patient is unconscious and lying on his/her back, the tongue presses against the pharynx, blocking the respiratory tract. By lifting the jaw and tilting the head backwards the respiratory tract can be opened.

Even though the patient is not breathing, his/her heart still functions for a short time, supplying oxygen to the brain and other parts of the body. Rapid resuscitation may save the patient.

Cardiac arrest means that the heart stops pumping blood, the circulation stops and the organs no longer receive the necessary oxygen transported by blood. The patient suddenly loses consciousness. The pulse cannot be felt from the carotid artery. The respiratory movements are gasping, or the breathing stops altogether. The eyes are glazed, the pupils are more or less dilated, the skin is pale and the lips turn blue. The cause of a cardiac arrest can be, for instance, cardiac infarct, arrhythmia, drowning, electrocution or anoxia of the heart caused by respiratory arrest.

Determining the patient's condition

It is important to find out what has happened in order to get a picture of the location and extent of the possible injuries. The patient is examined very carefully when an injury to the neck or head is suspected. If the patient has an injury to the spinal cord, moving his/her head may cause paralysis. If the patient does not react to outside stimuli, is not breathing, or the pulse cannot be felt, extra help must be called, and resuscitation started immediately. If the patient is unconscious, check whether his/her respiratory tract is open and whether he/she is breathing. Possible obstructions in the respiratory tract are removed (see Chapter 2 Foreign object in respiratory tract). If the patient starts to breathe after the respiratory tract is opened, and the pulse can be felt from the carotid artery, the patient is placed on his/her side (Figure 1). If the respiratory tract is opened, but the patient is not breathing, resuscitation is started. Resuscitation is effective when the patient is lying on his/her back on a firm, flat surface. If an unconscious patient is suspected of having a neck injury, he/she must be turned on his/her back extremely carefully.



Figure 1. An independently breathing unconscious patient placed on his side



Figure 2. Lifting the patient's jaw opens the respiratory tract



Figure 3. Listening to the patient's breathing



Figure 4. Feeling for the pulse from the carotid artery

Figure 5. The place to press is two widths of a finger from the lower edge of the sternum (breastbone)

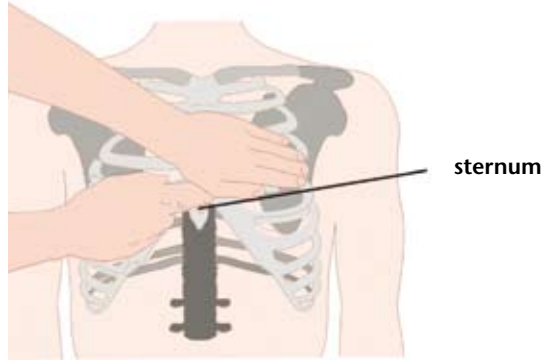


Figure 6. Cardiac massage is carried out with the heel of the palm, and the arms straight



Figure 7. Mouth-to-mouth respiration



Resuscitation

The person giving first aid should be at the patient's side, in such a position where it is easy to administer both mouth-to-mouth respiration and cardiac massage. Resuscitation is begun by opening the respiratory tract. The tongue is the most common cause of blockage in the respiratory tract in unconscious patients. It can be removed from the pharynx by tilting the patient's head backwards, lifting the jaw up and putting pressure on the forehead (Figure 2). The patient's breathing is detected by placing one's cheek in front of his/her mouth and nose, and simultaneously watching his/her chest: is the chest moving, can breathing be heard, or a flow of air felt? (Figure 3). If the patient does not start breathing after the respiratory tract is opened, resuscitation must be started.

Check the patient's circulation. Signs of functioning circulation are breathing, moving, coughing and swallowing. The time used for checking the signs of circulation must not exceed 10 seconds. The pulse can be felt by pressing gently on the carotid artery (Figure 4), where it can often be detected, even if a pulse from the wrist cannot be felt. The right place to feel the pulse may be difficult to find if the pulse is slow and irregular, or weak and rapid. If the pulse is felt, but the patient is not breathing, mouth-to-mouth respiration is continued to the rhythm of the helper's breathing, i.e. from 12 to 16 times per minute. Whether the patient starts to breathe on his/her own must be observed all the time.

If there are no signs of blood circulation and the pulse cannot be felt, the patient's heart has stopped. Cardiac massage must be started immediately. The right place to press is two widths of a finger from the lower edge of the sternum (Figure 5). Kneel at the patient's side with your arms straight and shoulders directly over the patient's chest. Place the heel of your palm on the patient's sternum, and the heel of

your other hand over the back of the first hand. The pressing is done with the heel of the palm and the arms straight all the time, using the weight of your upper body (Figure 6). The sternum is pressed vertically downward 4–5 cm. Press 30 times with the arms straight: the rate of pressing is 100 presses per minute. You should count aloud to ensure that the rate of the pressing is consistent.

After having pressed 30 times, mouth-to-mouth respiration must be started. With one hand, the head is pushed backward from the forehead and the nostrils are pinched closed with the thumb and forefinger. The jaw is lifted upward with the forefinger and middle finger of the other hand. During resuscitation, the patient's head is kept tilted backward in this way.

Mouth-to-mouth respiration is a rapid and effective way to oxygenate the patient. Take a deep breath of air, press your lips tightly around the patient's mouth, and slowly blow air into the patient's lungs (Figure 7). At the same time, follow how the procedure is working by observing the movement of the patient's chest. If the chest does not rise while air is being blown, the air is going into the stomach. In this case, the procedure must not be continued until the position of the patient's head is corrected. In addition, the mouth and pharynx should be checked for possible foreign objects or secretion. If needed, the mouth and pharynx are cleared by turning the patient's head to the side and removing the obstruction with a finger or a cloth wrapped around it. After this, continue mouth-to-mouth respiration, this time making sure the chest rises.

Blowing air into the stomach causes vomiting. If the patient is lying on his/her back, during vomiting the stomach contents pass into the lungs. This causes severe irritation of the lungs and later even life-threatening pneumonia.

Table 1. Resuscitation of an adult

Procedure	for an adult
cardiac massage	30 presses
location of pressing	lower half of the sternum
method of pressing	with both hands one on top of the other
depth of pressing	4–5 cm
rate of pressing	100 times per minute
mouth-to-mouth respiration	2 blows
rhythm of resuscitation	one first aider: 30 presses, 2 blows

The patient's pulse and breathing must be checked every few minutes. Return of the pulse is checked from the carotid artery. If the pulse cannot be felt, resuscitation is continued. If the pulse is felt, the patient's breathing must be checked. If the patient is not breathing, mouth-to-mouth respiration is given. Resuscitation is continued until the patient's body functions return, responsibility for the patient is transferred to medical professionals, or the helper's strength is depleted.

A summary of the resuscitation steps and the resuscitation rhythm are shown in Table 1.

Resuscitation drugs

The resuscitation drug found in the ship's pharmacy is adrenaline (8/A, 1 mg/ml). A dose of 1 ml is administered intramuscularly. Adrenaline constricts the peripheral circulation when the diastolic blood pressure during cardiac massage rises and coronary circulation improves. If the heart starts to beat, adrenaline increases the pumping strength of the heart.

- **Consult a doctor via Radio Medical on using drugs.**

2 When is resuscitation not started?

Resuscitation is not started if the patient is obviously dead, showing rigor mortis or livor mortis.

2 Foreign object in respiratory tract

In adults, a foreign object gets caught in the respiratory tract most often while eating something tough, for example, a piece of meat. The risk for this is increased by talking while eating, a prosthesis of the upper jaw (decreased feeling in palate), and drunkenness. Choking may resemble a sudden attack of illness: the victim gasps for air, holds his/her throat and, sometimes, collapses to the floor.

- **An attack of illness that occurs during a meal should primarily be treated as an emergency caused by a piece of food blocking the larynx.**

Sometimes, even a very small foreign object can cause a violent fit of coughing lasting for a few minutes. The condition of a patient who can cough is usually not very serious, and it is usually sufficient to bend the patient forward, pat him/her on the back, and calm him/her down.

If the patient cannot talk, he/she is asked if he/she is choking and told to cough. If the patient's condition deteriorates and he/she is not able to cough, help must be called and first aid procedures started quickly. First aid must be given rapidly and effectively, because there is not much time to lose. A foreign object blocking the respiratory tract completely can cause asphyxiation in a few minutes.

Position yourself behind the patient, bend the patient's upper body forward, and sharply hit him/her five times between the shoulder blades. If these blows do not help, the foreign object can often be removed by increasing the internal pressure of the chest with abdominal thrusts, i.e. the so-

called Heimlich manoeuvre. Stand behind the patient (Figure 8). Make a fist with one hand and place it on the patient's upper abdomen, your forearm along the patient's lowest ribs, and with your other hand take hold of your fist or wrist. Then pull forcefully inward and upward with your hands, and press the patient's costal arches closer together with your forearms. In this way the volume of the patient's chest decreases and its internal pressure rises. If one thrust does not work, the procedure can be repeated five times, if necessary.

If the abdominal thrusts do not work, or the patient is much greater in size than the helper, or the patient loses consciousness, he/she is turned on his/her side on the floor and hit sharply between the shoulder blades a few times.



Figure 8. Removing a foreign object with the Heimlich manoeuvre

If the foreign object is still not expelled, and the patient is not breathing, cardio-pulmonary resuscitation is started (the rhythm of resuscitation 30 presses, 2 blows). Blowing air might make it possible to get some oxygen into the patient's lungs past the foreign object, or cause the foreign

object to go deeper past the left bronchus and into the right bronchus. Thus, the left lung starts to function and the patient is saved. After successful resuscitation, a doctor must always be consulted via Radio Medical about possible further treatment.

3 Stopping major bleeding

Major bleeding must be stopped as quickly as possible. Especially if the bleeding is from an artery, the patient may lose a substantial amount of blood in a short time, which may quickly lead to shock. In arterial bleeding, bright red blood spurts with each heart beat. Venous bleeding is darker in colour, flows steadily and is less abundant than arterial bleeding.

Follow these instructions to stop bleeding:

- If the bleeding is from a limb, elevate the site of the bleeding above the level of the heart.
- Apply direct pressure to the wound using a clean dressing to quickly stop the bleeding. In an emergency situation, if no dressing is available and the bleeding is severe, you can use your hand alone.
- Place a clean dressing over the wound and use, for example, a roll of bandage or a matchbox to make a pressure bandage.
- Tie the wound with an elastic bandage.
- If the wound in a limb is large, splint the area of the wound during transportation.
- Avoid moving the site of the wound, so that the bleeding does not start again.

If the bleeding has been abundant, the lost blood must be replaced with intravenous infusion to prevent potential shock.

If the limb is amputated, there is a bleeding crush injury, or stopping the bleeding is otherwise not possible, a tourniquet must be placed above the site of the bleeding. However, there is danger involved in using a tourniquet. It must be so tight that it stops all circulation in the limb. If the tourniquet is too loose, it stops only the venous circulation, but not the arterial circulation, and the patient may bleed to death despite the tourniquet. Thus, a tourniquet is always an extreme measure, to be used only if the bleeding cannot be stopped otherwise.

4 Shock

Shock is a disturbance of the circulation that can originate from various causes. In a state of shock, the blood pressure is too low to maintain sufficient circulation, resulting in severe oxygen deficiency. Of the vital organs, the kidneys require the highest level of blood pressure in order to function properly (systolic blood pressure at least 80 mmHg). The same level of blood pressure is necessary for the pulse to be felt from the radial artery. If the pulse cannot be felt from the radial artery, the patient is in shock, or he/she will probably go into shock.

1 Causes

Shock has many causes. It can be caused by an insufficient amount of blood, due to, e.g. bleeding. Internal bleeding is usually not visible, and is therefore detected only when the symptoms of shock appear. Simple fractures (no open wound at the site of fracture) may bleed substantially into the tissues (Table 2).

The amount of blood that the patient has lost can be estimated by following the general state of circulation and the appearance of possible symptoms of shock (pulse, blood pressure, skin temperature).

Dehydration due to widespread burns, severe diarrhoea or vomiting may also cause shock. A strong allergic reaction, anaphylactic shock or sepsis may result in failure of the regulation mechanism of the blood vessels. This causes the blood vessels to expand and the circulating amount of blood can no longer maintain sufficient pressure. Failure of the heart's pumping strength in connection with myocardial infarction may also lead to insufficient blood pressure and shock.

2 Symptoms

The body tries to compensate the fall in blood pressure in many ways to ensure a sufficient blood supply to the vital organs, such as the heart and the brain. First, the heart rate increases. Then, peripheral blood vessels start to contract, peripheral circulation decreases strongly, and the skin, especially in the limbs, turns cold. The sweat glands are activated, making the skin feel cold and clammy.

Low blood pressure is a sign that the disorder has already progressed quite far. The pulse can no longer be felt from the wrist (systolic blood pressure under 80 mmHg) and the circulation of the internal

Table 2. Amount of bleeding in different fracture types

Type of fracture	Amount of bleeding, ml
Simple fracture	
rib	125/rib
humerus	350–800
shin bone	500–1 000
thigh bone	1 000–2 000
pelvis	1 500–2 000
Compound fracture	Amount of bleeding may be double that of a corresponding simple fracture.

Table 3. Symptoms of bleeding shock in relation to amount of blood lost

Amount of blood lost	Symptoms
10% (= 500 ml)	no symptoms
15–25% (= 750–1 250 ml)	slightly increased pulse (ca. 100/min)
25–35% (= 1 250–1 750 ml)	increased pulse (100–120/min) pallor, cold clammy skin blood pressure 90–100 mmHg
50% (= 2 500 ml)	pulse over 120/min blood pressure under 60 mmHg disturbances in consciousness

organs deteriorates. When systolic blood pressure has dropped to 60 mmHg, the brain starts to suffer from oxygen deficiency. The patient becomes restless or even aggressive. If the blood pressure keeps falling, the patient becomes confused, his/her level of consciousness then diminishes further until unconsciousness and death occurs. The relationship between symptoms of bleeding shock and the amount of blood lost is presented in Table 3.

Allergic (anaphylactic) shock is caused by expansion of blood vessels due to paralysis of the muscles in the vessel walls. In this case, the normal amount of blood cannot sustain sufficient blood pressure, because the volume of the blood vessels has increased. The pulse is rapid, but the hands and feet stay warm, unlike in shock due to other causes.

3 Treatment

Bleeding shock

The treatment of bleeding shock is primarily efficient first aid, securing basic vital functions and treating the causes of shock (see Chapter 1 First aid of vital functions). Make sure that the airways are open and the patient is breathing. Stop the bleeding. The circulation in the vital organs can be supported by placing the patient on his/her back and raising his/her legs.

- **Elevating the lower limbs enhances the circulation of the brain, the heart and other vital organs.**

Dehydration is treated with intravenous infusion therapy, that is, intravenous fluid replacement (see Chapter 45 Intravenous (IV) infusion therapy). The oxygen supply of the tissues is supported by giving oxygen (e.g. 28%) with a mask. Do not give the patient anything to eat or drink.

The patient's condition and level of consciousness must be continuously monitored, because his/her status may change very rapidly, and the treatment should respond immediately to any changes. It is important to monitor the blood pressure, pulse and temperature of the skin. Keeping the patient warm, and calming and reassuring him/her help to reduce the body's need for oxygen.

- **Consult a doctor via Radio Medical for further treatment of bleeding shock.**

Allergic shock

A sudden allergic reaction can be caused by an insect sting, food or a drug. Symptoms that may appear within minutes can be dyspnoea, runny nose, bloodshot

and itching eyes, rash, or even shock and death.

The first symptoms of an allergic shock may be reddening and itching skin, swelling of the tongue and the pharynx, wheezing breathing, a feeling of pressure in the chest, and difficulties in breathing. The blood pressure can drop and cause weakness, vertigo and fainting. The throat, the larynx and the respiratory tract may swell up, making breathing and swallowing difficult. Speech is often slow and clumsy. The condition can rapidly become life-threatening.

The first aid in allergic shock is always adrenaline (8/A, 1 mg/ml). The dose given to an adult is 0.5–1.0 ml subcutaneously or intramuscularly. If the symptoms are severe or shock is developing, or has already developed, the adrenaline is injected into the muscles of the tongue, where the circulation is good despite shock, and the drug is absorbed rapidly. Take hold of the tongue with a piece of cloth or paper, and inject the drug directly into the tongue (Figure 9). The injection can be repeated after 10–20 minutes.



Figure 9. Injection into the tongue

- **Treatment of allergic shock is always urgent and the first aid is always adrenaline.**

After alleviating the most dangerous situation with adrenaline, hydrocortisone 2 ml (5/C, 125 mg/ml) is administered intramuscularly. Treatment is continued with prednisolone (5/D) given daily in the morning. On the first morning the dose of prednisolone (5/D) is eight 5 mg tablets, all given at one time. The dose is reduced every other morning by 1–2 tablets, until the treatment is completed.

The patient should visit a doctor to try to determine the cause of the allergic reaction, so that, by avoiding the allergen, the reaction can be prevented from recurring.

- **Consult a doctor via Radio Medical on further treatment of an allergic reaction.**

In mild disorders (hay fever, itching eyes, nettle rash) without circulatory or respiratory symptoms, sufficient treatment usually consists of cetirizine hydrochloride (5/B) one 10 mg tablet once or twice a day, or prednisolone (5/D). To begin with, six 5 mg prednisolone tablets are given, all at one time. The dose is reduced every other day by 1–2 tablets, until the treatment is completed.

The patient should visit a doctor to try to determine the cause of the allergic reaction, so that, by avoiding the allergen, the reaction can be prevented from recurring.

5 Classification of patients according to treatment requirement

The classification of patients (triage) is carried out to identify severely injured patients who need immediate transportation and treatment. Triage is necessary when the number of injured persons is so great that all those in need of medical attention cannot be treated immediately.

Severely injured patients are divided into four priority groups (those in category one have to be transported for further treatment first, Table 4):

Priority Category I. Patients whose breathing and circulation have deteriorated or are deteriorating. An open respiratory tract is secured by placing the patient on his/her side, clearing the mouth and the pharynx, or, if necessary, installing an endotracheal tube (intubation). Imminent or obvious shock is treated at the scene of accident with intravenous infusion therapy (see Chapter 45 Intravenous (IV) infusion therapy). Fractured limbs of patients with multiple injuries are splinted. Burns are covered with sterile bandages. In case of injuries to the face, an open respiratory tract must be secured.

Table 4. Classification of severely injured patients according to urgency of treatment need

Priority category	Type of injury
I CATEGORY	<ul style="list-style-type: none"> • laboured breathing (caused by chest injury, brain injury or blockage in respiratory tract) • traumatic shock (caused by bleeding and crush injury) • multiple fractures • burns, over 20% (but under 70%) • crush injuries to the face • severe arterial injuries in the limbs
II CATEGORY	<ul style="list-style-type: none"> • unconsciousness without laboured breathing • chest injury without laboured breathing • injuries to the abdomen and urinary organs • burns, under 20%
III CATEGORY	<ul style="list-style-type: none"> • spinal cord injuries • mild brain injuries • simple fractures
IV CATEGORY	<ul style="list-style-type: none"> • severe brain contusions • crush injuries of chest and body • burns, over 70% • dying patients

Priority Category II. Patients whose condition, in spite of severe injury, does not deteriorate while waiting for transportation or treatment. Unconscious patients or patients with chest injuries, but no breathing difficulties, patients with injuries to the abdominal area, and patients with mild burns belong to this category.

Priority Category III. After receiving first aid, these patients can wait for further

treatment for a relatively long time. Patients with injuries to the spinal cord, mild brain injuries, or simple fractures belong to this category.

Priority Category IV. Patients whose injuries are so severe that they are not thought likely to survive. This category includes patients with crush injuries to the head, chest or body.

ACCIDENT INJURIES AND THEIR TREATMENT

III ACCIDENT INJURIES AND THEIR TREATMENT

- 6 Skull injuries and cerebral haemorrhage
- 7 Injuries to the eye
- 8 Injuries to the abdominal area
- 9 Bone, joint and muscle injuries
- 10 Amputation
- 11 Burns and frost injuries
- 12 Heat-induced illnesses
- 13 Electrocutation
- 14 Thermoregulation of organs and hypothermia
- 15 Near drowning
- 16 Poisoning

6 Skull injuries and cerebral haemorrhage

A skull injury that has caused a disturbance in consciousness can be verified either on the basis of what is known of the event, or by carefully examining the skin in the skull area. In obvious cases, where the injury can be detected by pressing with the fingers, the patient usually has cerebral contusion as well. This kind of injury requires immediate hospital treatment and often emergency surgery as well.

Loss of memory is usually related to skull injuries, and this often lasts clearly longer than unconsciousness. Loss of memory usually extends also to the time before the injury. After the injury, the patient may first have headache, and may even be confused. Usually the symptoms worsen in an upright position, so it is more comfortable for the patient to be lying down. The patient often experiences nausea or vomiting, and feels dizzy. If symptoms, such as stiffness of the neck, headache, nausea and photophobia, as well as neurological deficiency symptoms (numbness, lack of feeling, difficulties in mobility, disequilibrium) increase, this is always a sign of a more severe condition, for example, cerebral contusion or cerebral haemorrhage. The symptoms may worsen in only a few hours, or sometimes after a few days, when unilateral deficiency symptoms, such as paralysis, difference in pupil dilation, and speaking difficulties may appear.

The patient must rest as long as the symptoms last. Pain-killers or vertigo medications usually are not of any help. Ordinary pain-killers can even be harmful, if a head injury has caused internal bleeding, as many pain-killers increase the bleeding.

- **Always consult a doctor about a head injury via Radio Medical when**
- **headache deteriorates continuously**
- **there is double vision, numbness or sense disorders**
- **the level of consciousness changes from alertness to dozing, or there is a loss of sense of time and place**
- **vomiting is continuous**
- **one pupil is more dilated than the other**
- **there is bleeding from the ear or nose even though these are not injured**
- **there is clear secretion from the nose**
- **a bruise appears behind the ears or around the eyes even though these areas have not been injured**
- **convulsions occur.**

A patient with a skull injury must be sent to a doctor for further examination, even if hospital treatment may not be necessary. After a concussion, possible skull fractures have to be examined, and more severe brain damage has to be excluded by either clinical examinations or visualisation.

1 Concussion

In concussion, the period of unconsciousness after the injury is usually short, lasting only a few minutes, and there is often related loss of memory. In the beginning, the patient can be confused and he/she can have headache. Usually the symptoms worsen in an upright position, so it is much more comfortable for the patient to be lying down. The patient often experiences nausea or vomiting, and feels dizzy. There can be neurological deficiency symptoms as well, but they usually disappear in a few days. The symptoms are caused by damage to neural pathways that occurs in connection with concussion, but these will subside with time.

2 Cerebral contusion

A patient with cerebral contusion is usually unconscious for a longer time than a patient with concussion, but it is also possible that there is no state of unconsciousness at all. Neurological deficiency symptoms usually last for several weeks, and may leave permanent damage. Sometimes swelling or bleeding develops in cerebral tissue, causing the cerebral pressure to rise. In this case, the symptoms will begin to worsen, and the patient's condition deteriorates. The patient must always be sent to medical care and treatment, preferably to a hospital where his/her condition can be monitored for possible cerebral pressure symptoms.

3 Subdural bleeding

Subdural bleeding occurs usually in older people and alcoholics. Sudden bleeding is relatively rare. In subdural bleeding, venous blood penetrates the dura mater, and a sickle-shaped blood clot develops

on the surface of the brain. This directly irritates the cerebral cortex and presses the structures under it. Increasing bleeding causes an increase in cerebral pressure.

Cerebral membrane symptoms may occur quite rapidly after the injury: neck stiffness, headache, nausea and photophobia. Usually the symptoms deteriorate continuously for a few days, and gradually unilateral symptoms occur, for example, paralysis, difference in pupil dilation and speaking difficulties. However, symptoms that progress slowly and for a longer time, sometimes even for months, are more common. Imaging of the head and surgery must be performed urgently.

4 Epidural bleeding

Epidural bleeding is relatively rare, and usually occurs in children or young adults. In epidural bleeding, venous blood penetrates between the dura mater and the bone, and a lens-shaped blood clot develops. The first symptoms are followed by a remission, but neurological deficiency symptoms deteriorate quite rapidly, within hours if the bleeding continues. Imaging of the head and surgery must be performed urgently.

5 Skull fracture

Skull fracture may occur in connection with all of the injury types mentioned above, especially epidural bleeding. Usually a rather strong blow to the head is needed to cause a fracture. If the injury can be detected by pressing with the fingers, the patient usually has a cerebral contusion as well. The injury requires immediate hospital treatment and often also emergency surgery.

7 Injuries to the eye

It is important to examine without delay the patient who has had an injury to the eye, as the possible swelling of the eyelid can make the examination more difficult later on.

In order to assess the type of injury and its degree of severity, it is important to inquire what the patient was doing when the accident happened. The possibility that a foreign object is still in the eye has to be taken into account. If there is corrosive substance in the eye, first aid has to be started immediately.

When examining the patient's eye, the ability to see, the movements of the eye in different directions, and the condition of the eye's anatomical parts (eyelids, conjunctiva, cornea, anterior chamber, pupil, iris) has to be checked. It is important to examine the red reflex, because this gives information about the condition of the eyes' inner parts. The lack of the red reflex is usually a sign of a more severe injury.

If a penetration injury to the eye is suspected, the area around the eye should be treated with special care, and the patient must be kept lying down. The damaged eye is covered with a patch and the patient is transferred as an emergency case to an ophthalmologist for further treatment. It is important to keep the patient calm.

One symptom of an eye injury may be sudden pain and lacrimation (tears), caused possibly by a foreign object in the eye. Later on, the cornea may become reddish and the patient may have photophobia. A strong feeling of something in the eye and photophobia can appear after a few hours' exposure to intense radiation (so-called snow blindness). Deterioration of vision after an injury may be caused by internal bleeding in the eye or damage to the eye structure (detachment of the retina or the lens). Double vision may be a sign of an eye socket fracture, or damage to the eye muscles.

● After an eye injury consult a doctor via Radio Medical if

- a penetration wound is suspected
- the injury does not heal in a few days
- the redness, pain or swelling in the eye increases
- there is discharge from the eye
- changes in vision take place
- double vision occurs.

The treatment of the eye depends on the type and severity of the injury and what has caused it. It is necessary to examine whether the eye has been penetrated in the accident. If there is acid or alkali in the eye, rinsing must be started immediately. Any clean water can be used. Rinsing is done continuously for 30–60 minutes. During rinsing, the eyelids have to be held apart with the fingers, to allow the water to circulate under the eyelids.

1 A foreign object in the eye

The most common eye injury is a foreign object on the conjunctiva, meaning that there is something under the lower or upper eyelid, and the symptoms are severe pain and lacrimation (tears). A sharp, angular foreign object easily remains under the upper eyelid and moves with the eyelid, scratching the sensitive cornea. The pain disappears even if the foreign object is not removed, because the tactile nerve endings go numb. However, the pain starts again within the next 24 hours, when photophobia may occur and the conjunctiva may become reddish.

It is necessary to consult a doctor via Radio Medical if the feeling of something in the eye continues for over three days, even though the object has been removed from the eye, and drug treatment has been given.

Removing a foreign object from under the lower eyelid

It is easy to remove a foreign object from under the lower eyelid by drawing the eyelid downwards with the fingers, so that the underside of the eyelid can be seen. The object may then be wiped off with, for example, a cotton swab moistened with water.

Removing a foreign object from under the upper eyelid

The upper eyelid is turned up to remove the object from under it. The patient sits with head straight and looks downwards, keeping the eye open all the time. The upper eyelashes are held with the thumb and index finger, and the eyelid is stretched downwards and outwards (Figure 10). The stem of a cotton swab is placed in the middle of the stretched upper eyelid. The cotton swab is held in place and the eyelid is raised and folded over the swab. The eyelashes are held all the time, so that the eyelid cannot return to its normal position. The cotton swab is removed. The foreign object on the eyelid is then removed with a cotton swab moistened with water (Figure 11). The conjunctiva of the upper eyelid is wiped lightly, beginning from the outer corner and moving towards the nose, even if there is no visible foreign object on the conjunctiva. The hold on the eyelashes is released, and the patient is asked to blink when the eyelid returns to its normal position.

After the foreign object is removed, the pain usually stops. If it has scratched the cornea, the feeling that there is something in the eye continues. This state will improve by itself in a day or two as the



Figure 10. Turning the upper eyelid up to remove a foreign object



Figure 11. Wiping a foreign object off the interior surface of the upturned eyelid



Figure 12. A foreign object is removed carefully from the surface of the eye with a corneal spud

cornea heals, but eye drops or ointment (chloramphenicol, 10/B) may be used for a few days. The eye can also be covered with a light gauze bandage for 24 hours, if it helps the patient.

Removing a foreign object from the cornea

A good spotlight and a magnifying glass are needed to detect a foreign object on the cornea. The surface of the cornea is anaesthetized with oxybuprocain hydrochloride drops (10/C). The object can be removed with a corneal spud (Figure 12). An attempt can be made to remove a foreign object containing iron with a magnet that is drawn near the cornea. If the object leaves a rust circle behind, the patient must be referred to an ophthalmologist for further treatment.

After removal of the foreign object, eye drops or ointment are applied to the eye (chloramphenicol, 10/B). A light patch is placed over the eye for 24 hours.

2 Radiation injuries

The light from a welding torch, ultraviolet light, or strong sunlight may injure the cornea. The symptoms are photophobia and the feeling that there is something in both eyes. The symptoms occur a few hours after the exposure.

This condition is not dangerous even if the symptoms are intense, and the patient will recover in a few days. If the symptoms are unbearable, they can be relieved by applying anaesthetic drops to the eyes (oxybuprocain hydrochloride, 10/C), and drops that constrict the blood vessels (tetrahydrozoline hydrochloride, 10/A). To prevent inflammation, also chloramphenicol eye ointment (10/B) may be applied.

3 Injuries to the eyelids, and eyes swollen shut

A blunt blow to the eye area may cause bruises on the eyelids, which may swell the eye shut. In this case, examining the eye is difficult. The eyelids should not be opened forcefully, because the sensitive inner parts of the eye may have been damaged, and forceful treatment may exacerbate their condition. The swelling resolves in about two weeks.

Small wounds in the eyelids are sewn with thin suture thread, or the edges of the wound are held together with butterfly tape. The edge of the eyelid must be smooth after closing the wound, so that the eye can be closed tightly. If the edge of the eyelid is damaged, the patient should be referred to an ophthalmologist immediately.

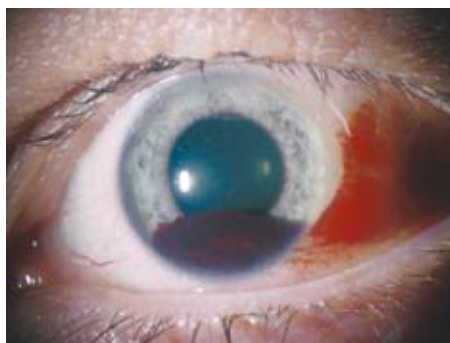


Figure 13. Bleeding in the anterior chamber of the eye and under the conjunctiva

4 Bleeding into the anterior chamber

The most common eye injury caused by a blow is bleeding into the eye's anterior chamber, where it may be seen as a dark red patch (Figure 13). In a severe injury, the whole anterior chamber may fill with blood.

If there is blood in the anterior chamber, the patient is ordered bed rest for a

couple of days. A gauze bandage is placed over the eye to ensure that the eye stays at rest and the bleeding does not recur. The patient is referred to an ophthalmologist as soon as possible, because bleeding into the anterior chamber leads to the risk of severe complications, such as a sudden increase in pressure inside the eye. Consulting a doctor via Radio Medical is always necessary.

5 Bleeding under the conjunctiva

The harmless, but visible sign of a blunt blow to the eye may indicate bleeding under the conjunctiva, in which a bright red haematoma develops on the sclera (Figure 13). This is not dangerous and needs no procedures or restrictions.

6 Penetration wound in the eye

The majority of penetration injuries to the eye occur in the front part of the eyeball. An injury caused by a sharp object or a fragment penetrating into the eye may be difficult to detect, especially if the penetrated part is elsewhere than in the cornea. Typical signs of penetration are a decrease in eye pressure, and bleeding in the frontal parts of the eye and the anterior chamber. The shape of the pupil changes and the iris may protrude into the penetrated part when the frontal part of the eye is penetrated. Damage in the posterior parts of the eye is difficult to detect.

If a penetration wound is suspected in the eye, the patient is kept at rest and the damaged eye is covered with a gauze bandage. The patient is referred to an ophthalmologist as soon as possible.

7 Corrosion wound in the eye

Corrosive substances damage the cornea and the conjunctiva. Alkalis cause more severe damage than acids. When an alkali reaches the moist surface of the eye, it first destroys the surface layer of the eye, and continues to penetrate into the deeper layers. In injuries caused by an acid, the surface layer of the eye is damaged, but at the same time the acid precipitates a protein barrier which protects the deeper layers.

If there is acid or alkali in the eye, rinsing must be started immediately with plenty of water. Rinsing can be started by the patient him/herself, or by someone else near the patient. Almost any clean water can be used. The rinsing is done continuously for 30–60 minutes. During rinsing, the eyelids have to be held open with the fingers, to allow the water to circulate under the eyelids.

If there is precipitating alkali in the eye, for example, slaked lime, the sediments should be removed from the surface of the eye with a moistened cotton swab. Anaesthetic drops (oxybuprocain hydrochloride, 10/C) may be applied from time to time to the surface of the eye.

After rinsing, chloramphenicol eye ointment (10/B) is applied to the eye surface for as long as there are symptoms in the eye, but no longer than 10 days. The ointment prevents inflammation of the eye surface and the development of conjunctiva adhesions in the eyelids. In severe corrosion cases, the patient is referred to an ophthalmologist.

8 Eye burns

Flames cause burns on the skin of the eyelids and the eyelashes and eyebrows burn. Usually the surface of the eye remains intact, however, as it is covered by

eyelids. A hot liquid may cause severe burns under the eyelids. The conjunctiva is damaged like skin. The heat causes the surface layer of the cornea to become opaque. A solid hot object causes a local burn.

In the case of all eye burns, it is necessary to consult a doctor via Radio Medical. After local anaesthesia, the burn scar on the cornea should be removed with a corneal spud in the same way as a foreign object from the eye. This helps the damaged part of the cornea to heal more rapidly. Afterwards the treatment is the same as for after removing a foreign object from the cornea.

9 Other eye symptoms

If the patient says, after a blunt blow to the eye, that he/she cannot see with the damaged eye in the same way as before, i.e. the patient sees distorted lines, or the lines are less clear than before. This can be caused, for example, by bleeding in the vitreous body, a rupture or detachment of the retina, or dislocation of the lens. In these cases, it is necessary to consult a doctor via Radio Medical, and the patient must be referred to an ophthalmologist for further examination.

8 Injuries to the abdominal area

1 Examination

Investigating what has happened and how the injury occurred gives a fairly good picture of the type and extent of the injury. There are often signs of external violence on the abdomen, for example, bruises and contusions. Pain can be felt in the area of the injured organ or in the whole abdominal area.

Sometimes it is difficult to judge whether, for example, a knife has really penetrated the abdominal wall, because it is possible that there is only an incision wound. However, sometimes it is possible to see from the shape of the wound and from what is known of the event that it is an incision wound. Examining the wound by probing, i.e. feeling the depth of the wound with the fingers or with a thin instrument is difficult and unreliable. Therefore, in uncertain cases it is always best to try to transfer the patient to a hospital as soon as possible.

2 Injuries and their symptoms

Injuries from blunt blows

A so-called blunt injury is caused by a hard blow to the abdomen or the ribs. Usually the cause of such an injury is a collision or, for example, a hard kick. Sometimes injuries can even be caused by a serious fall.

A rupture caused by a blunt blow to an internal organ can lead to internal bleeding. Sometimes the bleeding can be insignificant and will subside by itself. Usually, however, a rupture involves major internal bleeding, which causes pallor, a rapid pulse, and low blood pressure. Shock may follow rapidly and lead to death in a few hours. Fractures of the pelvis and the lumbar vertebrae also often lead to heavy bleeding into the abdominal cavity.

A blunt blow may also result in a rupture of the intestines or the urinary bladder. In this case, the contents of the intestines enter the abdominal cavity,

causing severe peritonitis, which usually leads to death if not treated. The degree of severity of the injury is difficult to assess, because internal bleeding is minor in ruptures of the intestine and bladder. The symptoms of peritonitis are exacerbating pain, as well as tension and tenderness of the abdominal wall. The symptoms appear gradually, so it is important to monitor the situation carefully.

Injuries from sharp objects

So-called sharp injuries are usually caused by a knife (e.g. a stiletto) stab, or a bullet. These are basically always penetrating injuries, i.e. they penetrate the abdominal cavity and damage internal organs. This may result in bleeding of an internal organ (liver, spleen), or in a penetration injury of a cavity organ (stomach, intestine, urinary bladder). In addition, the direction of the stab may cause a penetration wound from the thorax down through the diaphragm and into the abdominal cavity, or on the contrary, through the abdominal cavity up into the chest cavity and even to the heart. A stab directed at the pelvis or the buttock may penetrate into the abdominal cavity.

In such cases, the patient should be transferred to land for surgical treatment as soon as possible, because the probability of damage to the internal organs is great in all sharp injuries. When preparing the transfer and during it, intravenous infusion may be crucial for the patient's survival.

3 Treatment

It is crucial to follow the patient's condition carefully and at short intervals, because assessing the severity of the injury is difficult, and even impossible, on board. Consulting a doctor via Radio Medical is necessary. First aid and resuscitation must be made available, as the possibility of internal bleeding is great in abdominal injuries. The injured patient is placed in a resting posi-

tion. If there is even the slightest suspicion of internal bleeding, intravenous infusion is started at a standard flow rate (e.g. 20 drops/min, see Chapter 45 Intravenous (IV) infusion therapy). Thus, when shock develops, the patient already has an open blood vessel connection and the lost blood can be replaced.

If the transfer is delayed, and it is suspected that the patient is developing peritonitis, antibiotic drug treatment should be started. A non-vomiting patient is given, for example, ciprofloxacin (7/C), two 250 mg tablets three times a day. A more efficient antibiotic is cefuroxime (7/D) given as an intramuscular injection. It is suitable also for vomiting patients. The drug in the form of a dry substance ampoule is dissolved in 3 ml of sterile water, and then administered intramuscularly. The dosage is three injections in 24 hours.

4 Ruptured spleen and liver, and other abdominal injuries

Rupture of the spleen

A ruptured spleen is the most common injury caused by a blunt blow to the abdominal area. Its symptom is pain in the left side of the upper abdomen, under the costal arch. The result of the rupture is usually substantial internal bleeding, and its signs are pallor, rapid pulse and low blood pressure (shock). Without surgery, the bleeding usually leads to death in a few hours. If a rupture of the spleen is suspected, the patient must be transferred for surgical treatment immediately. While waiting for the transfer it is necessary to start intravenous infusion, which is increased if the blood pressure starts to fall. Sometimes a capsule around the spleen can suppress bleeding. Usually this 'tamponing' of bleeding is temporary, and new substantial bleeding can be expected in a day or two.

Rupture of the liver

A ruptured liver is less common, and a rather strong blow is needed for it to occur. Sometimes the bleeding may be minor and may subside by itself, but usually the result of the rupture is bleeding that leads to shock and death, as in a rupture of the spleen. Pain and possible signs of external violence (contusions, bruises) are observed on the upper mid-abdomen or in the area of the right costal arch. The treatment is the same as in a ruptured spleen: intravenous infusion is started on board, and the patient must be transferred for surgery as soon as possible.

Other abdominal injuries

Other reasons for internal bleeding in the abdominal cavity may be rupture of the mesentery and its blood vessels, rupture of the pancreas, or kidney contusion. Substantial internal bleeding in the abdominal cavity is often also related to fractures of

the pelvis and the lumbar vertebrae. The origin of the bleeding is very often determined only during surgery.

A blunt blow may also cause an intestine or the urinary bladder to rupture, only rarely does the stomach rupture. In this case, intestinal fluid enters the abdominal cavity, resulting in severe peritonitis. At first a possible injury is difficult to assess, because bleeding is not always significant, and the symptoms of peritonitis appear gradually. The condition is very serious and, if not treated, usually leads to death. The symptoms are exacerbating pain, tenderness and tension of the abdominal wall, the patient looks ill, the tongue is dry and the pulse is rapid. The condition requires hospital treatment on land, but intravenous infusion is of great help while waiting for the transfer. If peritonitis is suspected, antibiotic drug administration is started as described above.

9 Bone, joint and muscle injuries

1 Bone injuries

Bone fractures are divided into compound and simple fractures. In simple fractures, the skin of the fractured area is not broken, whereas in compound fractures it is broken. A compound fracture is more dangerous than a simple one, because bleeding is more substantial, and blood vessels and nerves are damaged more often, and there is always a danger of infection.

The symptoms of a fracture are pain, swelling, an abnormal position of the limb, and its abnormal movements or dysfunction. The patient may actually hear or feel the bone breaking. Sometimes the only symptom of a fracture is local pain.

Bleeding may be substantial in bone fractures. In simple fractures, even major bleeding cannot be seen, and thus, the possibility of shock has to be kept in mind. In a shinbone fracture, for example, the bleeding may be 500–1 000 ml, in a femur fracture 1 000–2 000 ml, and in a pelvic fracture 2 000 ml. In compound fractures, the bleeding may be even greater.

Major bleeding, related to fractures, may lead to haemorrhagic shock. Always monitor the development of the patient's condition!

Nerves can be damaged in the fractured area, possibly resulting in permanent tactile and movement disorders. There is pain especially when the bone ends rub

against each other. In compound fractures the risk of infection is high.

First aid and primary treatment

The injured limb must be supported adequately to prevent bleeding, pain and further injuries. If a fracture is not supported, the moving ends of the fractured bone may penetrate the tissue and nerves near that area, and even the skin.

If the limb is in an abnormal position because of the fracture, a doctor must be consulted via Radio Medical about the treatment procedures. In simple fractures of the long bones of the lower leg and the forearm, the limb or its part is pulled lengthwise to correct the abnormal position of the bone. The limb is then supported in this position. It is especially important to get the ankle into its natural position soon after the injury, because in an abnormal position it rapidly develops severe swelling, which hinders later correction of the ankle's position.

It is not worth trying to reposition fractures of the femur and upper arm. It is sufficient to straighten, and support the limb as well as possible.

- **Always consult a doctor via Radio Medical about fractures, especially if the limb is in an abnormal position.**

Before splinting compound fractures, they are covered with sterile gauze bandages moistened with saline (common salt and



Figure 14. Inflatable splint

water) solution. Cardboard, or inflatable or vacuum splints may be used as a support, or any equipment available for the purpose (Figure 14).

A splint made of a hard material must always be padded. The splint must cover the joint on both sides of the fracture. A shorter splint does not support the limb adequately. The splint must not hinder the blood circulation of the limb or chafe the skin. It has to be so firm that it does not break or bend during the patient's transpor-



Figure 15. A sling supporting an injury of the upper limb



Figure 16. Supporting a fractured rib with adhesive tape

tation. The splinted limb should be set in an elevated position and, if possible, place an ice bag on the fractured area (not in direct contact with the skin) to prevent bleeding and swelling. Usually it is enough to use a sling to support fractures of the upper limb and the collarbone (Figure 15). Additional support may be given by a second sling tied horizontally.

Fractured rib

A strong blow to the chest may break one or more ribs. The fractured end of a rib may penetrate a pleural membrane or a lung. This may lead to pneumothorax, a life-threatening condition.

The symptom of a fractured rib is pain in the injured area, which worsens on deep breathing. Sometimes a crackling sensation may be felt in the fractured area to the rhythm of breathing. Usually the fracture is at the side of the chest. If the sternum is pressed when the patient is lying down, this causes pain at the site of the fracture.

Painful breathing may be relieved with a support bandage: the fractured side is fastened with adhesive tape (Figure 16). Normal adhesive tape is suitable for the purpose. If the pain does not disturb breathing, taping is not needed, and the fracture heals with time.

- **Always consult a doctor via Radio Medical about rib fractures, if the patient has**
 - more than one fractured rib
 - dyspnoea
 - breathing difficulties
 - continuous cough
 - fever
 - abdominal pain
 - vertigo or a feeling of faintness when standing up.

Spinal fracture

A spinal fracture is always dangerous, because the spinal cord may be damaged and the patient may become paralysed. There is always reason to suspect a fracture of the spinal column or the cervical spine (neck) if the patient has fallen from a height or has been crushed by a machine.

The patient or an eye witness must be asked how the injury occurred. In addition, the surroundings are observed. If the patient is conscious, he/she must be asked about pain areas and possible numb or tingling areas. Numbness and tingling of the limbs are signs of injury to the cervical spine (neck), and the patient must be handled even more carefully to prevent further damage.

After checking the basic vital functions, attention is paid to injuries of the spinal column (back bone) and the cervical spine (neck). First, the spinal column and the cervical spine are observed without touching, looking for bruises and scratches, which may indicate spinal injury. After careful observation, the spinal column and the cervical spine are felt carefully with the hands, one vertebra at a time, without moving the spine, and at the same time asking about areas of pain. Pain in the spinal column and the neck area indicates a fracture, until otherwise proven.

- **There is reason to suspect damage to the spine, if**
 - the patient is unconscious
 - the patient feels pain in the neck or in the mid-back, or these areas are painful to the touch
 - there is numbness, tingling or diminished tactile sensation anywhere in a limb
 - it is difficult or impossible for the patient to move his/her upper or lower limbs



Figure 17. Supporting the cervical spine in a neck injury

- the patient's level of consciousness varies, or he/she is under the influence of drugs or alcohol
- the patient has extensive pains or some other injury, which prevents him/her from distinguishing neck symptoms.

The whole spinal column is examined carefully in the same way. The functioning and tactile sensation of all limbs should be checked. The patient is asked to move his/her fingers and ankles, and the fingers and toes are checked by pinching and touching. If the patient's movements are not successful, or if tactile sensation is diminished, spinal injury may be suspected.

First aid is limited to preventing further damage, and the patient should be transferred on shore for further treatment. The movements of the head and neck must be minimized by supporting the head with a neck rest when the patient is lying down (Figure 17). When placing the neck rest, any unnecessary movement of the head must be avoided.

Several persons are needed to support and lift the patient. When moving the patient, all movements in which the patient's back and neck may be bent or twisted must be avoided. The patient must be placed on a vacuum mattress or some other transfer mat with a single lift. The patient is transported calmly and steadily,

lying on his/her back, with the head and whole body adequately supported. There is no need to hurry if the patient does not have other injuries and if his/her vital functions are normal.

When treating a patient, it must be remembered that a (suspected) spinal injury should not prevent life-saving first aid. The patient's vital functions (e.g. an unconscious patient is placed on his/her side) must be taken care of first.

2 Joint injuries

Joint injuries can be divided into sprains and dislocations.

Sprains

In the case of a twisted knee or ankle, ligaments may be ruptured either partially or entirely. The limb or joint does not function normally, either because of the pain or a damaged structure. External bleeding is rare. The injury causes haematoma in the damaged area, often seen as swelling and a blue shade of the skin. The damaged area is painful.

The patient must be asked about painful areas and earlier injuries, because, for example, a joint is easily injured again after earlier ligament injuries.

The first aid in ligament injuries is the application of cold, and compression, and keeping the injured limb elevated. The injured joint is supported and the limb is lifted into an elevated position. A cold pack is placed on the injured joint, and fastened with an elastic bandage.

Dislocations

In the dislocation of a joint, a bone in a joint moves from its socket and may remain in an abnormal position. Usually the joint capsule and ligaments rupture. The most common dislocations are those of the shoulder and knee cap, followed by dislocations of toes, fingers, femur, forearm and lower jaw.

The symptoms are severe pain, swelling of the joint area, inability to use the joint in a normal way, and possibly a clearly abnormal position of the damaged joint.

The joint should be repositioned as soon as possible. Repositioning may be difficult and consulting a doctor via Radio Medical is often necessary. If repositioning is not successful, the joint is splinted in its current position, and the patient is transferred ashore for further treatment as soon as possible. Painkillers are needed, because the patient is tense and in pain.

Bone fractures may also occur in connection with sprains and dislocations. This possibility must be examined, even if the dislocated joint is repositioned on board.

Dislocated shoulder (upper arm)

The shoulder or upper arm is most often dislocated in a fall on an extended arm. If the shoulder has been dislocated before, the ligaments are loosened, and dislocation may occur as a result of even a minor injury.

The patient feels pain in the shoulder and cannot move his/her arm. The pulse is felt from the wrist, and the tactile sensation and moving of the fingers are checked. This ensures that blood vessels and nerves are not damaged. If the pulse or the tactile sensation is abnormal, a doctor must be consulted via Radio Medical.

The upper arm should be repositioned immediately after the injury. The patient is placed on a bed on his/her stomach, and the arm is allowed to hang down the side of the bed (Figure 18). If possible, a weight is attached to the upper arm to pull the limb downwards. If needed, more weight can be added. The patient may be given a muscle relaxant – a dose of diazepam (4/A, 5 mg/ml) as a 1–2 ml intramuscular injection. In addition, pain medication may be given if needed, for example, diclofenac 25 mg/ml (3/B) as a 3 ml intramuscular injection.



Figure 18. Repositioning the upper arm with a weight

If repositioning of the upper arm is not successful with a weight, repositioning may be aided by gently moving the arm back and forth, and pulling the top part of the upper arm away from the patient's body.

After the joint is back in place, it is necessary to use a sling for a couple of weeks. The upper arm must be examined upon arrival ashore, and an X-ray must be taken to make sure that there is no fracture. If the repositioning is not successful, the upper arm is supported with a sling, and the patient is transferred for further treatment.

Dislocation of a knee

Dislocation of a knee cap usually occurs towards the outer side of the leg, the knee being slightly bent. A dislocated knee cap usually returns to normal by itself immediately. The symptoms are pain, swelling and inability to move the knee joint.

If the knee cap does not reposition itself, the knee is straightened very gradually. At the same time, the knee cap is pushed carefully with the palm of the hand towards

the fore and inner side of the thigh. After the knee cap is repositioned, the knee is supported. It is a good idea to place a cold pack on the knee. The leg should be elevated to decrease swelling. The patient is transferred for further examinations and treatment on arrival in port.

If the repositioning of the knee cap is not successful, the leg is supported in the least painful position, and the patient is transported to hospital.

3 Muscle injuries

Muscle ruptures are usually related to sports. A muscle may rupture during exertion or as a result of a blunt blow directed at the muscle. There is bleeding into the tissue surrounding the ruptured muscle.

Rapid first aid prevents the extension of the injury and hastens recovery.

The symptoms of muscle injuries are local tenderness, painful movement, haematoma and, sometimes, a lump or a depression in the muscle.

First aid consists of cold, compression and elevation of the limb. In addition, the injured limb is kept at rest. Cold constricts the blood vessels and decreases bleeding. An ice pack, snow or anything cold pressed against the injured area helps. Elevating the limb and compression help to inhibit bleeding. The patient may press the injured area him/herself with the hand. The sooner that cold, compression and elevation are applied, the less bleeding there is into the tissues, and the faster the injured muscle heals.

10 Amputation

In an amputation injury, a limb or part of it is detached entirely as a result of external violence. Amputation injuries are most common in the fingers and hands. Nowadays it is possible to replant an amputated limb or part of it with the aid of microsurgery. However, in an accident, the limb may be so severely damaged that replanting is not possible.

For the replanting to be as successful as possible, the amputated limb or its part must be handled properly. In most cases, the results of replantation surgery are good, if the injured person is transferred for treatment immediately.

1 Stopping bleeding

The bleeding must be stopped. If the stump of the limb bleeds substantially, it is pos-

sible to press with the hands directly on the wound or the bleeding artery above the amputation. If this does not help, a tourniquet is applied to the stump. A sphygmomanometer cuff, into which sufficient pressure is pumped (above systolic blood pressure!) may be used. In an emergency, any belt, strap or piece of cloth may be used, as long as it is taut enough.

The stump of the limb is supported in an elevated position. A cold pack or ice pack is placed on the base of the stump to decrease bleeding by constricting the blood vessels.

If the bleeding is abundant, intravenous fluid replacement (infusion therapy) is started. Giving oxygen with a mask improves the oxygen content of the remaining blood.

2 Handling the amputated limb

The amputated part limb or its part is stored. The best place to store the limb during transportation is in a clean, air-tight plastic bag. This is placed in a bucket or a vacuum flask containing ice water (1/3 ice and 2/3 water). The amputated part must not be frozen, but it must be cooled, so that

it meets the requirements for replantation as long as possible.

After first aid, the patient and the amputated limb parts must be transferred ashore as soon as possible, preferably to a treatment facility where microsurgery is possible. The surgery must be done within six hours of the accident for the amputated part to be replanted successfully.

11 Burns and frost injuries

1 Burns

Burns develop when the temperature of the tissue rises above 45°C. Burns are caused by, for example, open fire, hot steam, hot liquid or a hot object, electricity or radiation. Corrosive chemicals may cause damage resembling a burn.

The skin and the underlying tissue are damaged by the heat. After the small blood vessels are damaged, plasma oozes abundantly from the burnt area. If the burnt area is extensive, abundant loss of plasma may lead to shock. The first aid in burns consists of protecting the damaged skin area from impurities and inflammation, and preventing the development of shock.

Classification of burns

Burns are classified according to their extent and depth. When the extent of a burn is determined, the so-called 9% rule is used as an aid (Figure 19). An area the size of the palm of the hand is 1% of the superficial area of the skin. If more than 15% of the skin area has been burnt, there is a risk of shock.

If only the outermost layer of the skin is damaged, the skin turns red and the injury heals in a few days leaving no scars. Pain, redness and blisters are related to a deeper injury. Healing takes two to three weeks and may leave a minor scar.

Skin that is damaged through its entire depth has a red leathery surface without blisters. There is only slight pain or no pain at all. Healing without surgical treatment is slow, and the injury leaves a scar.

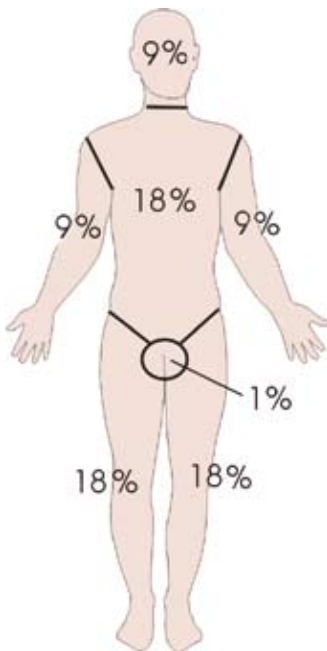


Figure 19. Determining the extent of a burn with the help of the 9% rule

First aid of a severe burn

In the case of fire, the patient must be moved to safety, and further injuries must be prevented. Burning clothes are extinguished by smothering the fire with a blanket or a carpet, for example. While this is being done, the patient is kept lying down, so that the flames cannot burn the respiratory tract, neck or face. If the patient has been exposed to smoke, or carbon monoxide poisoning is suspected, he/she must be moved into the fresh air immediately. Symptoms of carbon monoxide poisoning may be headache, dizziness, confusion and loss of consciousness.

First aid procedures are the same as in any life-threatening situation: make sure that the respiratory tract is open, and that both breathing and blood circulation are functioning. The state of the vital functions must be assessed, and resuscitation started immediately, if necessary. In burns caused by electricity, attention must be paid to the possibility that the electric shock may have caused immediate cardiac arrest.

If a respiratory tract burn is suspected, oxygenation of the tissues is supported by giving oxygen with a mask. Skin burns in the face area, scorched nasal hair and burnt nasal mucous membrane are signs of a severe respiratory tract burn.

- **Always consult a doctor via Radio Medical, if**
 - **the extent of a burn with blisters is over 15%, or a more severe burn covers more than 10% of the skin's surface area**
 - **the burn is on the hands, feet, face or genitals**
 - **smoke has been inhaled**
 - **it is an electricity burn.**

- **Consult a doctor and prepare to evacuate the patient as soon as possible, if**
 - **the burn is on the face**
 - **nasal hair is scorched**
 - **mucous secretion is charred, or the patient has difficulties breathing.**

If more than 15% of the total skin area has burnt, intravenous infusion should be started within the first hour to prevent shock. The infusion flow rate is calculated according to the so-called Parkland formula, i.e. $\frac{1}{4} \times \text{patient's weight (kg)} \times \text{extent of burn (\%)} = \text{amount of fluid given intravenously, ml/hour}$ (drip chamber 20 drops = 1 ml). Treatment is continued at this flow rate for 8 hours. Consulting a doctor via Radio Medical is necessary.

Pain medication is given to the patient if needed. For a severely burned patient, even morphine (20 mg/ml, 3/C) may be given 0.2–0.4 ml subcutaneously. Monitoring the patient's condition is of prime importance, as in all serious first aid situations. All patients with over 15% burns must be transported ashore for further treatment.

Local first aid and treatment of skin burn

The burnt area is cooled as soon as possible with water (temperature about 20°C) for 10–30 minutes. If blisters have developed on the skin, they must not be perforated, but an ointment dressing is placed over the blisters, with an ordinary bandage placed over it.

The bandages are changed after a few days. Parts of the bandage adhering to the injured area may be soaked off with a rinsing solution. A patient in pain is given pain killers.

If there are signs of inflammation in the burn area, such as hotness, redness or a rise in temperature, it is treated in the

same way as an inflamed wound. The treatment consists of an antibiotic, cefadroxil (7/E), one 500 mg tablet twice a day, and cleaning the wound daily when changing the bandages (see Infected wound, Chapter 47).

2 Frost injuries

When there is a threat of lowered temperature (hypothermia), the peripheral blood circulation of the body is minimized, and the skin and extremities are exposed to the surrounding cold. The hypothermic patient may also have local frostbite, and a prolonged hypothermic condition speeds the development of frost injuries in the limbs. On the contrary, there is rarely risk of hypothermia in the case of a local frost injury.

Symptoms

The symptoms of a local frostbite are tingling pain, numbness of the skin and its wax-like or bluish, marble-like pallor, and poor mobility of the injured body part.

In superficial frostbite of a limb, the skin is white and numb. Pain and clear blisters, which may extend to the tips of the fingers or toes, appear on the injured

area soon after warming, but they are signs of only minor tissue damage. Small dark blisters, on the other hand, are a sign of deep severe tissue damage.

Treatment

The injured area must be protected from further damage and further exposure to cold. The injured area must not be rubbed with snow, and neither should the frozen joint area be moved (no walking if the toes are frostbitten).

The frostbitten area is warmed with warm skin, for example, by placing the injured body part into someone's armpit. The fastest way to warm the injured part, which also causes the least tissue damage, is to use 40–42°C water in 20 minute periods, but this is painful. A less painful, but less efficient means, is to gradually raise the temperature of the water.

Pain medication may be used to alleviate pain. After warming, the injured area is protected with sterile bandages. Folded bandages are also placed between the injured fingers or toes. It is good to keep the limb in a slightly raised position. For further treatment, follow the general principles of treating wounds.

12 Heat-induced illnesses

Various symptoms may be caused by excessive exposure to heat.

1 Sunstroke

Sunstroke is caused by exposure to exceptionally extensive heat radiation to the head, for example, from sunlight. The use of a protective helmet may prevent

evaporation of heat from the head, thus enhancing the heat effect of the sun. The symptoms are headache, nausea, vertigo and irritability. Usually it suffices to move the patient to a cool place to rest, with the head slightly elevated. A cool moist pad on the forehead makes the patient feel better.

2 Fainting due to heat

Fainting caused by heat occurs especially during the first days of a heat wave, and in connection with a sauna bath. Because of the heat, the blood circulation is directed to the skin and lower limbs, while at the same time the circulation to the brain weakens, causing a temporary loss of consciousness. Treatment consists of placing the patient in a cool place, lying down with the feet in an elevated position. The patient may be given something to drink.

3 Heat spasm

Sweating causes loss of water and salt, which may lead to heat spasm. Painful muscle cramps usually occur in the thigh, back or abdominal area. The level of consciousness is normal, but the pulse is rapid.

First aid consists of stopping exertion, having the patient rest in a cool place, and giving him/her slightly salty liquid to drink. It is possible to get some idea of how much body fluid has been lost by comparing the patient's weight to his/her earlier normal weight. After heat spasm, the muscle pains disappear in a couple of weeks.

4 Heat exhaustion

Sweating causes loss of water and salts (sodium and potassium) from the body, and this may lead to heat exhaustion. The symptoms are sudden excessive fatigue and weakness, headache, nausea and possibly vomiting, confusion, heart palpitation and rapid breathing. The body temperature is usually slightly raised, but sometimes it can rise to even over 40°C.

The patient is moved to rest in a cool place, and water is sprinkled on him/her to cool down the skin. If the level of consciousness is good, the patient is given liquid orally, but if unconscious or confused, intravenously. Consulting a doctor via Radio Medical is necessary.

5 Heat stroke

Heat stroke is a rare, but extremely severe condition. The organs cannot sufficiently eliminate the heat, which has either been produced in the body during physical exertion, or which has come from outside the body. In this case, the temperature of the body rises excessively. If the body temperature rises above 42°C, cell damage begins in the body tissues. The most sensitive areas are the brains and the liver, but excessive heat may also affect the heart and cause arrhythmia.

The symptom is usually sudden loss of consciousness. At first, the patient is confused, the pulse is rapid and blood pressure low. As the condition proceeds, breathing becomes rapid and panting, and the patient may vomit and have diarrhoea.

Heat stroke should be diagnosed immediately, because starting treatment rapidly is crucially important. The patient is placed on his/her side in a cool place, and water is sprinkled on him/her. The skin and especially the head must be kept moist all the time, and the cooling should be accelerated by ventilation (for instance with a fan). It is necessary to start intravenous fluid replacement therapy (infusion therapy). Immediately after first aid, a doctor is consulted via Radio Medical, and his/her advice is followed.

13 Electrocutation

Electrocutation (electric shock) is usually caused by careless handling of electricity or electrical equipment, or faulty conducting wires or devices. The consequences to health from an electric shock depend on the voltage and power of the current.

The symptoms of electric shock may be tingling, muscle pain, burn, loss of consciousness, and possibly cardio-pulmonary arrest. Electricity may also paralyze the victim, making him/her unable to detach him/herself from the electric device. As a result, the damage caused by the electricity is even more severe.

Be very careful when helping an electrocuted victim. The victim conducts electricity as long as he/she is in touch with the electric circuit. Damp clothes and environment conduct electricity well, while rubber gloves and boots are good insulation against electricity. Dry wood, textiles and newspaper are fairly good insulators as well.

- **Do not touch the injured person, unless you are certain that the current is turned off.**

Great care must be taken especially in high voltage accidents. The risk of damage from an electric arc is considerable, when one is approaching conducting wires, as an electric arc may extend a distance of dozens of centimetres from the wires. Proper rescue measures cannot be started until an electrician has cut off the high voltage current.

- **In the case of electrocutation,**
 - **do not put yourself at risk**
 - **turn off the current**
 - **detach the injured person from the source of electricity**
 - **resuscitate.**

If the current cannot be turned off quickly by, for example, turning off a switch, disconnecting the contact plug, or other similar means, then, in low voltage accidents, the injured person may be detached using a piece of dry wood, cord, or a piece of clothing. Never use a damp object or metal object for this purpose.

When the victim's basic vital functions have been checked, any possible burns caused by the electric current are treated. Monitoring the victim's condition carefully is crucially important, because arrhythmia and even cardiac arrest may occur even after the electric shock is over. It is especially important to monitor the heart beat. Preparations must be made to start resuscitation rapidly, if necessary.

14 Thermoregulation of organs and hypothermia

1 Thermoregulation of organs

The human being is warm-blooded and is able to sustain a stable body temperature, despite temperature changes in the environment. In normal conditions, heat is produced by metabolism, muscle exertion and digestion.

By contracting the skin's dermal blood vessels, the body can decrease the evaporation of heat through the skin down to 1/5 or 1/6 compared to normal conditions. The body is able to decrease blood circulation in the limbs, which in turn decreases the area releasing heat, by guiding venous blood circulation inwards to the blood vessels near the arteries. Because the body always tries to secure the oxygen level of the brains, the blood vessels in the head do not contract even if it is very cold. If unprotected, the head may release heat in cold conditions, up to 40–95% of all the heat produced by the body.

In a crisis situation, for example, under water, the lowered body temperature protects the brains from damage caused by lack of oxygen. The cold causes the metabolism in the brain to slow down, and thus the need for oxygen decreases.

A person's ability to resist cold depends on the body's surface area and mass, that is, the body structure. Tall persons have a larger heat-releasing surface area than short persons. The subcutaneous fatty layer of obese persons acts as insulation to retain body heat. Good physical condition increases the ability of the body to produce and sustain heat by muscle exertion, while illness, and the poor physical condition resulting from it, diminish this ability.

2 Hypothermia

Hypothermia, or lowered body temperature, occurs when the body cannot sufficiently increase its heat production in cold conditions. The temperature of the internal

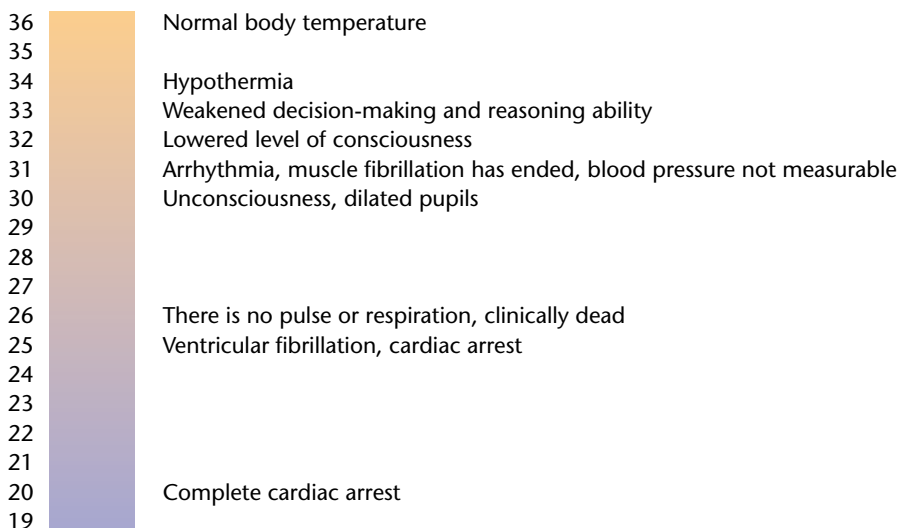


Figure 20. The development of symptoms of hypothermia as the body temperature falls

organs gradually falls, and the body's heat balance is disturbed.

Hypothermia may develop either rapidly or slowly. Hypothermia may occur rapidly in water or in extremely cold weather conditions without proper protective clothing. Wet clothes, or if the patient is injured, bloody clothes, increase the release of heat. Hypothermia, in turn, increases bleeding and decreases the coagulation of blood. Increased release of heat is related to extensive burns.

Hypothermia develops slowly, for instance, in a fatigue situation (fatigue hypothermia). It is caused by the combined effects of cold, fatigue and lack of energy. The development of hypothermia may be enhanced by some illnesses (e.g. diabetes), medications (drug poisoning), age, inexperience in dealing with cold (abnormal climatic conditions) and malnutrition.

The effects of cold on the body are the same regardless of whether the body temperature has fallen rapidly or slowly. A person can be considered to be hypothermic, if the temperature of his/her internal organs is below 35°C.

The development of hypothermia

The symptoms that describe the level of hypothermia are typical to the development of hypothermia, but the condition may also develop insidiously, without the first symptoms, feeling in the skin, or shivering (Figure 20).

When the body temperature starts to fall, the pulse rises and blood pressure increases strongly, and the breathing becomes rapid. The basic metabolism may be 700% more active than in normal conditions. The body tries to raise its temperature by muscle fibrillation, but this is possible only when the temperature is at least 32°C, below which fibrillation ends permanently. The cooling of the muscles may cause extensive spasms in the lower abdomen, which use up more physical

energy. The skin turns pale and cold all over the body.

When the temperature of the internal organs falls from 35°C to 30°C, the functioning of the central nervous system is disturbed. The patient is conscious, but his/her judgement and initiative weaken as the body temperature falls. When the temperature of the internal organs is below 33°C, the level of consciousness is markedly lowered and hallucinations are possible. The patient may feel very hot, and so may begin to take off his/her clothes, thus decreasing further the chances of survival.

The temperature threshold between minor and severe hypothermia is about 33–32°C. When the temperature of the internal organs falls below 31°C, the human being becomes cold-blooded. This means that the body is unable to return the temperature back to normal.

As hypothermia progresses, the blood pressure, pulse and breathing begin to slow down rapidly. When the temperature of the internal organs is below 32°C, arrhythmias of the heart's atria and ventricles are common. The blood pressure is no longer measurable when the temperature of the internal organs is about 31°C. The pupils are dilated, and eye movements and reflexes disappear as the hypothermia deepens.

The patient loses consciousness when the temperature of the internal organs falls below 30°C. The rigidity of the muscles increases, muscle fibrillation having ended. The pulse and breathing continue to slow down: the rate of breathing is 5–10 times/minute. Arrhythmias increase.

The elasticity of the lungs and the functioning of the respiratory muscles deteriorate as hypothermia progresses. The limbs are increasingly rigid and the patient no longer reacts to external stimuli. The basic metabolism gradually slows down to half its normal capacity.

The functioning of the liver and the kidneys slows down.

The pulse and respiration 'disappear' altogether when the temperature of the internal organs is about 26°C, and the patient appears clinically dead. When the temperature falls below 25°C, ventricular fibrillation or cardiac arrest occurs. Complete cardiac arrest occurs when the temperature of the internal organs is 20°C.

The severity of hypothermia

Assessing the severity of hypothermia is always based on measuring the temperature from the patient's colon. If it is not possible to use a thermometer, the assessment may be made with the help of observations and clinical symptoms:

- If the victim's skin feels cold at the mid-body from under the clothing, hypothermia is possible. Coolness of the limbs is not enough, because there may be several other reasons for that.
- If the victim is conscious and he/she is shivering, the temperature of the internal organs is above 32°C. A continuing fall in the level of consciousness and related hallucinations, clumsiness and indifference are signs of progressing hypothermia.
- A victim in a state of deep hypothermia may appear dead, but he/she must not be considered dead before being warmed up, and the subsequent resuscitation efforts have proved futile.

The situation must be evaluated carefully but rapidly. What has happened and what is the condition of the victim? This information quickly gives an overall picture of what has happened. The information about the events, the victim's current condition, and the extent of the temperature decrease make it easier for the doctor to assess the patient's condition via Radio Medical. This information is also needed if the patient must be evacuated ashore for further treatment.

Treatment of hypothermia

First aid to a conscious patient

A conscious hypothermic patient who is able to move must be told to change his/her clothes for dry ones, and especially to protect his/her head. If necessary, other people may give their clothes to the patient. After this, he/she should move about gently, to increase the body's own heat production. The patient is guided to the best shelter available, to room temperature. Artificial warming must be avoided, because it may result in a burn to the cold-damaged and sensitive skin. It is a good idea to give the patient lukewarm sugary fluid to drink, as this increases the energy storage. The patient must be encouraged: the desire to live is powerful.

The first aid of an unconscious hypothermic patient, or a hypothermic patient with a disturbed level of consciousness

A hypothermic unconscious patient, or a patient with a disturbed level of consciousness, who cannot move, has to be treated extremely carefully. Careless turning of the patient, removing clothes, or rubbing of the limbs and active warming of the patient may cause a sudden so-called after-drop phenomenon. In such a case, the cooled blood, which has remained in the limbs, starts to move, and when the cool blood reaches the heart, it cools down the cardiac muscle and may cause ventricular fibrillation.

- **The limbs of a hypothermic patient must not be rubbed or moved unnecessarily.**

Wet clothes are taken off with the patient lying down, if this is thought to be necessary. There is no point in taking clothes off an unconscious patient. The patient must

be moved off the ground and protected from wind and cold.

Further cooling down is prevented. If possible, 40°C fluid intravenously and extra oxygen with a mask are recommended and safe first aid measures. The limbs must not be rubbed, nor the patient actively warmed!

A hypothermic patient is moved lying down, if possible. During the transfer, active warming must be avoided to prevent the after-drop phenomenon. Resuscitation attempts during the transportation are contraindicated. Further treatment is given in accordance with the advice received via Radio Medical.

15 Near drowning

Breathing is impossible under water, but there is enough oxygen in the blood and pulmonary alveoli to sustain human metabolism for 2 to 5 minutes. Lack of oxygen causes brain damage, and its severity increases as the amount of carbon monoxide accumulates in the body, thus increasing the acidity of the blood, when breathing is not possible.

In northern regions, for example, the waters are cool even in summer. This lowers the body temperature, slowing down the metabolism and decreasing the body's need for oxygen. Thus, the survival time of a submerged victim is prolonged.

In some cases, victims who have been submerged for over 30 minutes have recovered completely, when resuscitated. Therefore, resuscitation must always be started, even if the victim has been submerged for a longer time.

The victim must be rescued from the water as soon as possible. Cardiopulmonary resuscitation must be started as quickly as possible. There is rarely so much water in the lungs that it affects resuscitation. Therefore, time should not be wasted in attempts to remove water from the lungs. Resuscitation is continued until the person's heartbeat has clearly re-

covered. Resuscitation is continued at the place of rescue, and all the time during the transportation of the victim. It is difficult to declare a hypothermic patient dead, because in this situation, weak clinical signs of life are not easy to detect.

After successful resuscitation, every victim who has been submerged must be monitored very carefully. Consulting a doctor via Radio Medical is always necessary. If possible, the victim is transported for further treatment and monitoring to the nearest hospital on shore, because even after the basic vital functions and level of consciousness have recovered, there is a great risk of so-called secondary drowning. This means that suddenly, after several hours, pulmonary oedema and breathing insufficiency may develop. The symptoms are increased breathing difficulties and 'wet' rales heard from the lungs. Breathing is rapid, and foam or mucus may appear in the mouth. The first aid for pulmonary oedema is giving the patient oxygen, while the patient is in a sitting position. To remove the fluid from the lungs, furosemide (10 mg/ml, 1/C) is given as a 2 ml injection intramuscularly. The victim must be evacuated on shore for further treatment as soon as possible.

16 Poisoning

Poisoning on board may be related to work (e.g. carbon monoxide poisoning in connection with a fire or exposure to the cargo), or is caused by one's own behaviour (e.g. alcohol or drugs). The latter cases are more usual. In this section, the general treatment of poisoning cases and the principles of dealing with some poisonous substances are described. A list of various harmful substances and treatment procedures after exposure to these substances are given in the latest edition of the MFAG book (Medical First Aid Guide for Use in Accidents Involving Dangerous Goods, IMO).

1 Dangerous cargo

Cargo is classified as dangerous, if exposure to it is harmful to health. Documents accompanying this type of cargo inform the ship crew of the nature of their cargo already before loading. According to international rules and regulations, the ship has to be equipped with the antidotes mentioned in the MFAG, and required by the cargo.

In addition to actual dangerous cargoes, there may be other hazardous or harmful chemicals on board, for example, fuels, lubricants, detergents, solvents, paints, disinfectants (e.g. chlorine), and the chemicals found in refrigeration equipment. These may involve health risks in irregular conditions or if handled carelessly. It is life-threatening to visit or to work without appropriate protective equipment in premises where, for example, the fermentation process of timber cargo has caused a lack of oxygen, or where gas emissions displace oxygen.

2 Exposure

A substance that is dangerous to health may enter the body via

- respiration (gas, vapour or mist)
- absorbance through the skin or mucous membrane (liquids and partly gaseous substances)
- eating or drinking; oral route into the digestive system (powdery or liquid substances).

The respiratory tract is the most usual path by which a poisonous substance enters the body. The hazard is often further increased by the simultaneous absorption of the same substance through the skin (solvents, some central nervous system poisons). The swallowing of a poisonous substance accidentally is rare. This usually happens when an attempt has been made to suck a dangerous liquid from one container to another with a tube.

Accidental exposure through the mouth is possible from dirty hands or contaminated food supplies. In premises where dangerous substances are handled, eating and smoking should be avoided, even if there is no risk of fire.

3 Symptoms of poisoning and their appearance

The health effects of poisonous substances may be local or general reactions. Irritation or even local corrosion (skin, eyes, mucous membrane) may appear at the contact site. Gases have the same effect on the respiratory tract. Allergic reactions or central nervous system effects are common.

The effect of a dangerous substance may be immediate or delayed. Usually the effect of a gaseous substance appears immediately, whereas the effects of substances

that are either swallowed or absorbed through the skin appear later.

Poisoning may cause sudden, severe illness, vomiting, convulsions or diarrhoea. Also dozing or unconsciousness may be caused by poisoning. Medications or alcohol bottles found in the premises may give a clue as to why the patient has fallen ill or is unconscious. This may also provide information about the quality or quantity of the used substance.

It must always be borne in mind that the patient is not necessarily suffering from poisoning. An attack of illness (myocardial infarction, cerebral haemorrhage) or unconsciousness due to other causes (e.g. an injury) must not be excluded.

4 Protecting the rescuers and preventing the situation from worsening

In the case of poisoning, especially the protection of the rescuer and first aid personnel must be ensured. An area where there may be poisonous gases or vapours, should not be entered without appropriate protective equipment (e.g. self-contained breathing apparatus, gas mask, protective gloves and protective clothes).

A person who has been exposed to gaseous substances must be moved into fresh air, away from the dangerous substance. If his/her clothes are soaked with the dangerous liquid, they must be removed as quickly as possible, and the skin must be cleaned with, for example, water. Remember your own protection in this case, too (e.g. protective clothing, gloves, face mask). Contaminated clothing must be handled carefully to prevent further exposure.

5 Treatment of poisoning

The first aid and treatment of a patient who has been exposed to sudden poisoning is in general the same as the treatment of a patient who has fallen ill suddenly. In severe poisonings, ensuring breathing and functioning of the heart is of prime importance, and only afterwards is attention paid to other symptoms caused by poisoning, and their treatment.

Poisoning that has been caused by a sudden or a single strong exposure to a specific poisonous substance must be treated on board. Consulting a doctor via Radio Medical is usually necessary. After the first aid given on board, the patient is usually transported for further treatment on shore.

● In the case of poisoning

- protect yourself and others
- help the exposed patient to safety
- ensure the victim's basic vital functions
- consult a doctor
- carry out the treatment
- monitor the situation
- consult the doctor again, if necessary.

6 Preventing a substance from being absorbed

Removing contaminated clothes and cleaning the skin prevent the further absorption of the substance from the clothes and skin into the body. A substance which has entered the body orally, stays for a few hours in the stomach before moving on and being absorbed into the blood circulation from the intestines. When the substance is still in the stomach, it is possible to try to prevent its further absorption.

Oral poisoning is treated with fine-grained medicinal charcoal (8/D) mixed in water. The initial dose is 50 g taken all at once. Thereafter medicinal charcoal 25 g is given every 4 hours, until the patient has recovered. Using charcoal tablets is difficult, and they should not be used if powdery medicinal charcoal is available. The action of medicinal charcoal is based on its wide absorption surface, which binds poisonous substances several times its own weight.

In general, medications that induce the patient to vomit should not be used at all in poisonings.

7 Hastening the excretion of a poisonous substance and reversing its effect

After absorption, poisonous substances leave the body mainly through elimination by the liver or through secretion into the urine via kidneys. The elimination of the poison may be speeded up by increasing urinary excretion, by giving the patient fluids to drink and a diuretic (furosemide, 1/C), either one 40 mg tablet or a 2 ml intramuscular injection. In severe cases of poisoning, it is justifiable to start intravenous fluid infusion therapy. Thus, if the patient's condition deteriorates, there is an already open blood vessel connection through which to give drugs and possible antidotes.

8 Inhaled substances and what to do in gas poisoning

Combustion gases, like carbon dioxide, carbon monoxide and nitrogen compounds, are common causes of poisoning through the lungs. Several chemicals may irritate and damage the respiratory tract as they evaporate (e.g. chlorine). The irritation symptoms of the respiratory tract are coughing, secretion of mucus, and

breathing difficulties. Often also watering or smarting eyes or nose are common symptoms.

The lack of oxygen, and carbon monoxide poisoning causes malaise, headache and dizziness. Intense or prolonged exposure leads to unconsciousness and convulsions.

The basic guidelines are the same as in all poisoning cases: the rescuer's own protection is of prime importance before saving others. The exposed patients must be transferred to fresh air as soon as possible. If necessary, the patients' breathing may be aided by giving oxygen.

A drug which opens up the bronchi is often a useful aid in alleviating breathing difficulties. First, two sprays of salbutamol (6/A) are given twice at 15 minute intervals, then two sprays 4–6 times a day. If chemical pneumonia is suspected, it is necessary to start cortisone medication (consult a doctor via Radio Medical). The patient's condition is monitored carefully, until it is certain that there will be no further complications.

9 Swallowed poisonous substance

Substances are corrosive if their pH is below 2 (strong acids), or above 12 (strong alkalis, such as washing machine detergents). They cause immediate symptoms, for example, pain and burns in the area of the mouth, pharynx and oesophagus. The symptoms in the alimentary tract caused by most swallowed substances are at first minor and worsen only gradually.

The symptoms in the alimentary tract (stomach pain, vomiting, diarrhoea) may be the first signs of any swallowed substance that is dangerous to health. Central nervous system symptoms, such as malaise, dizziness, confusion or unconsciousness, may appear later. Heart and kidney symptoms are also possible (arrhythmia, lowered urine excretion, for

example in mushroom and ethylene glycol poisonings).

In drug poisonings, intestine and heart symptoms often appear first, and later, central nervous system or breathing symptoms. Sudden apnoea without specific prior symptoms may be related to overdoses of some pain-killers.

An attempt must be made to clarify the content of the swallowed substance, its quantity and when it was swallowed. If the substance causing the poisoning is known, then Radio Medical may give detailed information on how best to proceed in treating that particular poisoning.

If a corrosive chemical has caused the poisoning, the patient is given water or other fluid in small quantities, altogether 2–3 dl, to dilute the substance already in the stomach. The patient is never made to vomit if he/she has swallowed some corrosive chemical or industrial solvent, because then the solvent easily ends up in the lungs, causing pneumonia.

- **A patient who has swallowed a corrosive substance must not be made to vomit.**

The treatment of an unconscious patient consists of maintaining the functioning of the heart and breathing. It is usually enough to monitor the patient if he/she has alcohol intoxication, and if the patient does not have any injuries and has not taken drugs with the alcohol.

10 Poison splashed on the skin

A poisonous substance may irritate or corrode the skin locally, or be absorbed through the skin and affect the whole body. Some substances have both a strong local irritating effect and general effects (e.g. phenol, fluorine hydrogen acid).

Contaminated clothes are removed, at the same time avoiding exposure oneself. After this, the skin is cleaned by rinsing. Corrosion or burns caused by the substance are treated. If the substance can be absorbed through the skin, and its amount has been excessive, possible systemic symptoms are to be expected and prepared for.

11 Eye exposure

Many corrosive or irritating substances, in the form of splashes or vapours, cause corrosion or irritation injuries to the eyes. Strong alkalis may corrode the cornea permanently even in a short time. However, in most cases, the corrosion is superficial, healing in a few days.

When a substance has entered the eyes, they must be rinsed for a sufficiently long time, about 30 minutes. Because the eyelids tend to close, they often have to be held open with the fingers, so that the rinsing liquid may reach as wide an area as possible in the eye as well as under the eyelids. If there is severe pain in the eye, pain killers may be given orally at the same time as rinsing is started. After rinsing, anaesthetic drops (oxybuprocain hydrochloride, 10/C) may be applied on the eye, and in more severe cases, the eye may be covered with sterile gauze.

12 Poisonous substances

Alcohol

In most cases, the cause of alcohol intoxication is ethyl alcohol. In general, an intoxication of over 3.5 pro mille content of alcohol is considered a poisoning. However, habituation to alcohol greatly influences the quality and severity of the symptoms. Drugs taken simultaneously with alcohol often influence the symptoms. Especially tranquillizers taken together with alcohol have an effect on breathing,

and death related to alcohol intoxication is often caused by depressed breathing induced by the drugs.

Injuries related to drunkenness may decrease the level of consciousness. In that case, it is difficult to distinguish which symptoms are caused by alcohol intoxication and which by the injury.

Methanol and ethylene glycol

Methanol, that is, methyl alcohol, disintegrates in the body into more noxious substances, causing, for example, deterioration of eyesight, and in large doses, permanent blindness. A dangerous dose is as small as 50–60 ml of pure methyl alcohol! If methyl alcohol poisoning is suspected, the patient must be transported to hospital as soon as possible.

Ethylene glycol, which is used to prevent corrosion and as an antifreeze, may cause damage to the kidneys, if consumed orally. A dangerous dose is 100 ml, and its effect appears a few days after drinking it.

In the case of both methanol and ethylene glycol poisoning, it is necessary to contact a care unit via Radio Medical. Drinking ordinary alcohol slows down the disintegration of the poisonous alcohols into more noxious products, and thus, it may be used as a first aid in methyl alcohol and ethylene glycol poisoning.

Drug poisoning

The most common drugs causing poisoning are mood and sleeping medications affecting the central nervous system (CNS). Their overdoses result in fatigue and doiness. Large overdoses additionally cause unconsciousness or convulsions. Overdoses of pain killers that affect the CNS may, especially if taken together with alcohol, cause breathing to stop. Large overdoses of ordinary pain killers and fever medications may cause intestinal bleeding a few days after taking the drug. Similarly, paracetamol may damage the liver. In the case of

overdoses, the use of medicinal charcoal is recommended even hours after the drug has been taken.

Carbon monoxide and carbon dioxide

Carbon monoxide is an ordinary gas which is formed in connection with burning. It is odourless, colourless, tasteless and lighter than air. The symptoms related to carbon monoxide poisoning are malaise, headache, a feeling of weakness, and arrhythmia. The symptoms result from the fact that carbon monoxide prevents the transportation of oxygen by the blood, thus causing a lack of oxygen in the body. High concentrations of carbon monoxide are soon followed by unconsciousness and death. First aid consists of preventing further exposure and moving the patient to fresh air. Oxygen is given, if necessary.

Carbon dioxide is formed in all burning processes. It may also develop, for example, as a result of the slow fermentation process of a timber cargo. Carbon dioxide gas is heavier than air, and it therefore displaces the air in closed premises, for example, in the lower parts of the cargo hold. Carbon dioxide poisoning is treated in the same way as carbon monoxide poisoning.

Hydrochloric acid

Splashes of diluted hydrochloric acid corrode the skin and the eyes, and undiluted hydrochloric acid also irritates as a vapour. Like other acids, hydrochloric acid reacts strongly with alkalis, forming poisonous gases. First aid consists of rinsing with water, if the acid has been splashed on the skin or eyes.

Sulphuric acid and nitric acid

If undiluted, sulphuric acid and nitric acid are very corrosive. Sulphuric acid evaporates already at low temperatures, forming gases that irritate the eyes and respiratory tract. Nitric acid decomposes into nitric

oxide which, at low levels of exposure, irritates the eyes and respiratory tract, and at high levels of exposure, causes breathing difficulties as well. Delayed pneumonia may result from exposure to nitric gas, and may appear even as late as a few weeks after exposure.

Hydrofluoric acid

Strong hydrofluoric acid evaporates easily, and large amounts of it cause severe corrosion to the skin and mucous membrane. Even small amounts are irritating. Splashes of strong hydrofluoric acid cause immediate deep corrosion injuries, while less than 20% acid causes local symptoms hours after the exposure has ended.

First aid consists of rinsing the acid off the skin as carefully as possible, and applying a thin layer of calcium gluconate gel (see MFAG) to the injured area, until the pain is alleviated. If the injured area is larger than the size of a palm, the patient should be quickly transferred to hospital for treatment on shore.

Phenol

Phenol vapours irritate the mucous membrane, and a stronger than 5% solution is also corrosive. Phenol is also absorbed through the skin, causing severe poisoning, convulsions and symptoms of shock. Treatment consists of rinsing the injured area carefully with water, and then washing with polyethylene glycol solution (see MFAG).

Chlorine

Chlorine gas has a typical pungent smell. At small concentrations, it irritates the mucous membranes, thus contracting the bronchi. At very high concentrations, chlorine gas may cause sudden apnoea.

Chlorine as a solution causes severe corrosion of the eyes, and irritation and burns on the skin.

If there is chlorine on the skin, it must be rinsed and then treated like a burn. A patient exposed to chlorine gas is given oxygen and medication that dilates the bronchi (salbutamol, 0.2 mg/ spray, 6/A, 1–2 sprays three times a day) if necessary.

Ammonia

Ammonia gas is irritating at small concentrations, but at very high concentrations, it may cause the airways to swell up and become blocked in a few minutes. Liquid ammonia causes severe corrosion of the eyes and burns on the skin. The patient must be moved to fresh air. To overcome severe breathing difficulties, adrenaline (8/A) is given 1 mg/ml as a 0.5–1.0 ml intramuscular injection, or subcutaneously. In the case of less severe symptoms, medication to dilate the bronchi is given (salbutamol, 6/A, 1–2 sprays three times a day).

Cyanides and hydrogen cyanide

Both gaseous hydrogen cyanide and solid cyanides are extremely poisonous, and absorb easily through the skin. Cyanide compounds rapidly cause apnoea and convulsions. Small concentrations may cause symptoms such as rapid breathing, numbness of the limbs, headache and malaise. Cyanide solutions corrode the skin. The patient is given oxygen and is placed in a resting position. If amyl nitrite ampoules are available (see MFAG), one ampoule is broken onto a gauze bandage, which is then placed inside an oxygen mask, through which the patient breathes in the substance.

SYMPTOMS AND DISEASES AND THEIR TREATMENT

- 17 Headache, and pain in the head region
- 18 Vertigo
- 19 Alteration of consciousness and seizures
- 20 Eye problems and symptoms
- 21 Illnesses of the ear and the throat
- 22 Problems of the mouth and the teeth
- 23 Chest pain and cardiovascular diseases
- 24 Difficulty in breathing
- 25 Diseases of the airways
- 26 Vomiting, fever and diarrhoea
- 27 Constipation and haemorrhoids
- 28 Abdominal pain
- 29 Obstetrics and gynaecological disorders
- 30 Symptoms of the lower abdomen and acute diseases of the urinary organs
- 31 Sexually transmitted diseases (STD)
- 32 Dry and itchy skin
- 33 Rash
- 34 Protective gloves and protective skin ointments
- 35 Joint and muscle pain
- 36 Mental disorders
- 37 Alcohol and drugs
- 38 Infectious and contagious diseases
- 39 Diabetes

17 Headache, and pain in the head region

Headache is a symptom that can have many different causes, e.g. fever, infections, circulatory disorders and poisoning. Sometimes headache may be life-threatening.

1 Symptoms

Sometimes tiredness or listlessness may precede a headache, which may last from a few hours to a couple of days. The pain itself can be one-sided and pounding, or it may be continuous, constricting or pressing pain, or the feeling of a tight band across the forehead. Sometimes a headache can worsen if the patient moves or, conversely, motion can ease the pain. There may also be nausea and vomiting in connection with headache.

Cerebral meningitis and brain fever (cerebrospinal meningitis) usually induces a severe headache that worsens during physical exercise. Other symptoms include a lowering of consciousness, nausea, and typically tightness of the muscles of the neck. Sometimes the patient also has seizures and is disoriented.

A headache can also be caused by external factors such as a hangover. Persons who usually drink much coffee during the day, and suddenly stop doing so, will probably experience headache as a withdrawal symptom. Severe poisoning is often accompanied by headache (e.g. carbon monoxide poisoning).

2 Treatment

The basic cause of the headache should be investigated as thoroughly as the situation permits. It is often necessary to consult a doctor through Radio Medical. A patient

with a sudden onset of headache that clearly gets worse during exercise, and that lasts for a considerable time should be transported to further examination by a neurologist.

● **In cases of headache, always consult a doctor via Radio Medical if**

- **the patient describes the headache as the worst he/she has ever experienced**
- **the arm or lower limb on one side becomes powerless, numb or paralyzed, or one side of the face seems to droop**
- **the patient has difficulty in speaking**
- **the patient has fever, stiffness in the neck, and skin rash**
- **the headache worsens continuously**
- **the headache gets worse in physical strain, and the patient has not had migraine earlier**
- **the patient vomits recurrently, and has no history of earlier migraine**
- **the patient has seizures**
- **the headache lasts over 24 hours.**

If the headache seems to be related to stiffness of the neck and shoulder muscles, it might be helpful to relax these muscles by warming them with a hot compress, massage, or stretching. Sometimes also physical exercise helps.

Once the possibility of a severe illness has been ruled out as the cause of the headache, medical treatment can be tried. In the early stage, or if it is mild, a headache usually lessens with common painkillers (e.g. diclofenac 3/B). A person

who is allergic to acetylsalicylic acid can be given only paracetamol (3/A). If nausea makes dosing orally difficult, a nausea-inhibiting suppository can be given first (metoclopramide hydrochloride, 2/C).

Strong painkillers that affect the central nervous system, such as morphine (3/C) should normally not be used to treat headache.

3 Types of headache

Tension headache

Tension headache is one of the most common types of headache. The pain is continuous, constricting, pressing or felt as a tight band across the forehead, but not pounding. It can be accompanied by short stabbing sensations and tender areas on the top of the head. No nausea or vomiting is associated with the pain, nor any marked sensitiveness to light. The pain is usually relieved or vanishes altogether when the patient exercises. The pain can last from a few minutes to several hours or even days. A hot compress or massage usually aggravates the situation, but a cold compress on the neck may relieve the symptoms.

Migraine

A migraine attack can be preceded by tiredness, lethargy or even over-activeness, which may last from a few hours to a couple of days. Many patients suffering from migraine see sharp-edged zigzag images of light before or at the onset of an attack. Such a preliminary feeling, a so-called aura, can also be felt as numbness of the arm and/or hand, or the cheek, or as difficulties in speaking and finding words. A patient with migraine may even experience temporary paralysis on one side, in which case it is difficult to differentiate between migraine and a transient cerebral haemorrhage. Usually some time after the

aura a one-sided headache begins, and the patient usually seeks bed rest. Migraine is very often accompanied by nausea, at times by vomiting, and occasionally even by diarrhoea. The patient is sensitive to light, sounds and smells.

A migraine attack can last for as long as three days, during which time the patient may be more or less in bed and almost completely incapacitated. In most cases the patient him/herself recognizes the headache as migraine.

A milder onset of migraine can be treated with painkillers. If nausea makes dosing orally difficult, another option is to give the medication as a suppository together with a nausea-inhibiting suppository. In some migraine patients, ergotamine suppositories help to alleviate severe attacks.

Headache caused by chemicals

Many chemical and medical substances and stimulants can cause headache. Such substances include:

- alcohol (hangover)
- caffeine (withdrawal symptom)
- substances containing nitro (1/A)
- monosodium glutamate ('the Chinese restaurant syndrome')
- drugs, withdrawal symptoms (cannabis)
- carbon monoxide
- pain killers when used in high doses and for a long time.

The most well-known is probably the hangover induced headache after mild alcohol poisoning, and the headache which results from suddenly giving up coffee after normally drinking five cups a day. All these headaches are circulatory, worsen with movement, and are throbbing in nature. They are often accompanied by nausea and weakness.

Headache caused by cerebral meningitis

Meningitis is inflammation of the lining around the brain. The symptoms of meningitis vary, but nearly always include headache that worsens with exercise. The patient usually has fever and a stiff neck, as in cerebral haemorrhage. Other symptoms may include sensitivity to light, nausea, vomiting, drowsiness and confusion. The symptoms may be milder in the case of viral meningitis, whereas in the case of bacterial meningitis, the symptoms may appear quite suddenly. A person in the later stages of bacterial meningitis may have seizures and lose consciousness (pass out). Meningitis is a life-threatening disease.

- **Consult Radio Medical immediately, if you suspect that someone might have meningitis!**

Headache caused by an intracranial process

An intracranial process that requires space causes headache by stretching the pain-sensitive meninx and intracranial blood vessels. There is about 1 dl of extra space within the skull, and when this has been taken up, the symptoms aggravate markedly. The most important causes of this type of headache are:

- brain tumours
- cerebral haemorrhage
- expansion and malformation of the intracranial blood vessels
- disruption in the circulation of cerebrospinal fluid.

The pain is characteristically dull, and is markedly aggravated on exertion, in which case the pain becomes pounding. Nausea in the mornings is also related to this condition.

Headache caused by other illnesses

Many respiratory infections, especially influenza, cause headache. The pain is usually constant, sometimes pounding. Often the symptoms, such as fever, coughing, sneezing and secretion of mucus, reveal the correct diagnosis. Maxillary sinusitis also often causes a headache around the cheek bones and the forehead. Typically, the patient has difficulty in lowering his/her head. If the head is lowered, a constricting pain is felt in the area of the sinuses. The treatment includes treating the actual infection, and giving pain-killers if necessary. Other infections (e.g. ear ache, tooth ache, problems relating to the jaw joint, etc.) can also cause one-sided headache.

18 Vertigo

Vertigo is a fairly common symptom in all age groups, and may be related to many different illnesses. It is a functional disorder of the sense of balance. The sense of balance is based on information from three basic systems: the vestibular organ of the inner ear, the proprioceptors of the striated muscles of the neck and spine (positional sense), and the eyes.

Vertigo means uncertainty in being able to stand, a falling sensation, or a feeling that the world is spinning around. Sometimes it is clearly related to positional changes or to a particular position. Turning the head can cause vertigo, as can suddenly rising from a bent-over position, or from bed. Vertigo can be accompanied by nausea and vomiting, and sometimes a ringing in the ears. In most cases vertigo will stop on its own after a while. If the vertigo does not end despite treatment, or is related to disruptions of consciousness or headache, it may be a symptom of some more serious condition.

- **Consult a doctor via Radio Medical if**
- **vertigo is related to disruptions of consciousness or headache**
- **vertigo continues despite medical treatment.**

1 Examination

Interviewing the patient helps in making the diagnosis. Motion sickness is related to repeated back-and-forth motions. Vertigo experienced when getting up from a bent position or from lying down can be explained by low blood pressure; the cerebral circulation is momentarily weakened and causes a passing state of vertigo, even a brief blackout.

The basic examination includes taking the patient's blood pressure, and examining the eye movements and how the pupils react to light.

2 Treatment

A sudden spell of vertigo can be treated with 10 mg of metoclopramide hydrochloride (2/C) in the form of a 10 mg pill or injection three times a day, or with a 20 mg suppository of the same. In the treatment, and especially in the prevention of motion sickness, cyclizine hydrochloride (4/C) is used. The treatment of position- and movement-related vertigo is to avoid the particular movement or position causing the vertigo. Changes in position should be made more slowly than before.

3 Causes of vertigo

Sea sickness

Sea sickness is the most common cause of rotation vertigo. It is often accompanied by nausea and vomiting. The cause is the continuous swinging and rocking motion of a ship, resulting in a state of irritation of the inner ear and sense of balance.

Positional vertigo

Positional vertigo manifests a few seconds after a change of posture as a short attack of vertigo lasting less than a minute. The patient has the symptoms in clear phases from a few days to a week, and they have a tendency to recur.

The treatment is to repeat the motion causing the symptoms a few times. This usually lessens the symptoms. Medical treatment is seldom necessary.

Ménière's disease

Ménière's disease is caused by a defect in the inner ear. Its symptoms include rather severe vertigo and nausea usually lasting for hours. Hearing is weakened in the afflicted ear, and tinnitus (ringing in the ear) is often experienced as well.

Infection of the vestibular organ

Infection of the vestibular organ is a viral infection that may follow e.g. a respiratory infection. The symptoms are a sudden spinning vertigo, nausea and vomiting. The condition passes on its own after a few days or weeks.

Dizziness

The most common cause of vertigo is tenseness in the muscles of the neck and shoulders. Vertigo is experienced as a

feeling of uncertainty when walking, or unsteadiness when moving one's head. This is usually manifested when the line of sight is directed to a different direction than the motion. Physiotherapy in the form of massage of the neck and shoulder muscles usually helps the patient.

Ataxia

Ataxia is a falling sensation or a rocking motion that usually originates in the brain. The most common cause is a disruption of cerebral circulation. This results in a lack of oxygen in the brain, or a cerebral infarction (stroke). Sometimes an epileptic seizure may manifest as vertigo. It is important to transfer the patient for further examination so that the primary cause of the symptoms can be found and treated.

19 Alteration of consciousness and seizures

Unconsciousness is a dramatic event that always requires immediate first aid and further examination.

1 First aid in cases of unconsciousness

When treating a person who has suddenly lost consciousness, it is crucial to check for the presence of the basic vital signs and to make sure that the patient

- is breathing; if not, begin mouth-to-mouth resuscitation
- has a heartbeat; if not, begin cardiac massage
- has open airways that also stay open.

2 Assessing the level of consciousness

The level of consciousness should be assessed immediately in accordance with the Glasgow Coma Scale. The scale is also useful for noting changes in the level of consciousness.

The highest scores from all areas of assessment are added together. The range of points is from 3 to 15. If the sum score is 8 or less, a disruption in the state of consciousness is clear and the situation is serious. The patient's condition should be monitored very carefully.

Opening the eyes	
• eyes are open or the patient opens them spontaneously	4
• eyes are opened on request	3
• eyes are opened when provoked with pain	2
• eyes are not opened even when provoked with pain	1
Ability to speak	
• answers questions properly	5
• is confused, incoherent	4
• uses words out of context	3
• utters sounds	2
• does not utter sounds even when provoked with pain	1
Motion control	
• moves all limbs on request	6
• pulls hand away from pain and uses other hand to help (localizes)	5
• pulls hand away from pain without helping with the other hand (dodges)	4
• bends both arms towards the head while rotating them inwards when provoked with pain (flexion)	3
• straightens both arms alongside the body while rotating them outwards when provoked with pain (extension)	2
• does not move when provoked with pain	1

- **Always consult a doctor via Radio Medical when a patient has lost consciousness.**

3 Further treatment of an unconscious patient

Background information

The eyewitnesses should be asked about how the loss of consciousness occurred and what they know about the patient. Important information includes details about the incident, possible preliminary symptoms like seizures, medication, possible intoxication, injuries and previous illnesses.

Monitoring and intravenous infusion therapy

An unconscious patient is moved to a calm and safe location. If the patient is breathing, he/she should be placed lying down on his/her side. If he/she has difficulty in breathing, intubation is recommended. Breathing is aided with a hand-held respi-

rator, if necessary. If the patient has trouble with breathing, oxygen should be given.

- **An unconscious patient should never be left unmonitored.**

If the patient does not regain consciousness within a few minutes, intravenous fluid infusion should be started if possible. Basic saline solution should be used, and the speed of infusion should be 15–20 drops/minute (20 drops = 1 ml). An intravenous connection makes rapid treatment possible.

Other forms of treatment

The level of blood glucose should be measured in all cases of unconsciousness, especially if the patient's skin is cold and clammy to the touch. If the blood glucose level is low (less than 3 mmol/l), 1 mg of glucagon (8/C) should be injected subcutaneously, or into the muscle. If there is no certainty about the level of blood glucose, glucagon can be administered, if a low

blood sugar level is suspected, as a too high level of blood glucose is less harmful than a too low level.

If the patient responds to pain and attempts to open his/her eyes in a normal way, the unconsciousness may be psychological in origin. No treatment is needed, but 5 mg of diazepam (4/A) as an intramuscular injection is recommended.

Headache and vomiting, neurological symptoms, disturbances in equilibrium, and functional disorders of the limbs, associated with symptoms of disruption of consciousness indicate a severe disturbance of the central nervous system. Consulting a doctor through Radio Medical is recommended.

The patient should be kept at rest. As first aid for nausea, metoclopramide hydrochloride can be given as a suppository or an intramuscular injection, or prochlorperazine as a suppository. Even if the patient is in pain, morphine should not be given, as it can interfere with the patient's breathing. In case of seizures, 5–10 mg of diazepam (4/A) can be given intravenously or intramuscularly, but also diazepam can have an adverse affect on breathing.

- **A patient with symptoms of cerebral palsy should be moved to shore for further treatment as soon as possible.**

If the unconsciousness is accompanied by seizures, the patient's movements should not be restrained. Instead, the patient should be placed in a safe location, and he/she should be protected from falling or hurting him/herself. It is of no use to try to place something between the patient's teeth. The patient can be given diazepam (4/A) either as an injection into the vein (2 ml slowly; can cause respiratory arrest!) or as an intramuscular injection. The treatment will not affect the on-going seizure, but may prevent onset of the next one. If

the seizure does not end within a few minutes, the treatment can be repeated. If the situation does not resolve itself, a doctor should be consulted via Radio Medical.

4 Causes of loss of consciousness

The most common causes of sudden disruptions of consciousness are

- sudden fainting
- decreased blood glucose levels
- a fit of epilepsy
- psychological factors
- a cerebral circulation disorder
- unconsciousness caused by an injury
- poisoning.

Sudden fainting

Fainting is the most common form of disruption of consciousness. It is caused by a lack of oxygen in the cerebral cortex, which may be due to, e.g. distress or being upset, strong stress, staying up late, a hangover, or e.g. the sight of blood. Sometimes fainting can be related to urinating, defecating, or a fit of coughing.

Unconsciousness due to low blood glucose level

Unconsciousness caused by a low level of blood glucose is almost always connected with diabetes that requires insulin treatment. Fluctuations in blood glucose levels do not cause unconsciousness in healthy individuals. Before losing consciousness, the patient is often disoriented, sweaty, restless and shaky, and his/her skin is cold and clammy to the touch. When the blood glucose level falls, the patient may have seizures. The blood glucose should always be measured from an unconscious patient.

Hysteria

Unconsciousness resulting from psychological causes is often very dramatic and complex, and can be associated with fussing and seizures. Such an episode

usually takes place when other people are present. Commonly it is also 'soft', which means that the patient falls, as by accident, on top of a bed or other soft surface. The type of attack has usually been learned from the person's immediate social environment, e.g. a friend who suffers from epilepsy. During the attack, the patient reacts to pain and opens his/her eyes in a normal way. For instance, an attempt to intubate immediately 'cures' the patient. Any possible further treatment should be psychological in nature.

Unconsciousness due to cerebral circulation disorders

Unconsciousness that is related to cerebral circulation disorders and cerebral haemorrhage is a sign of a serious condition. It is usually connected with cerebral thrombosis (stroke) or some other serious neurological syndrome. The patient should always be transferred for further neurological examination.

A disruption of the cerebral circulation usually causes disturbances in equilibrium. There may be functional disorders in the limbs on both sides, in addition to unconsciousness. Cerebral haemorrhage can in the beginning cause seizures, unconsciousness, headache and vomiting. The symptoms may diminish on their own, but the paralysis may be permanent. Consulting a doctor via Radio Medical is recommended. A patient with symptoms of paralysis should be transported for further treatment as soon as possible.

Cerebral haemorrhage can be initiated by strong exertion (intercourse, lifting or pushing a heavy burden). In such cases the wall of a blood vessel in the brain ruptures and causes a sudden onset of symptoms. The symptoms of cerebral

haemorrhage include severe headache and nausea. The neck is typically very stiff. Unconsciousness occurs often. Usually the symptoms of paralysis are minor, but the patient feels unwell and often vomits. The patient should be transferred for further treatment immediately!

5 Seizures

If the patient has seizures, care should be taken that he/she does not hurt himself. Seizures can be caused by misuse of alcohol, drugs, a brain tumour, encephalitis, a disruption in cerebral circulation, or a congenital defect in the brain. As soon as the immediate situation has been resolved, the patient should always be transferred to a doctor for further examination.

An epileptic seizure can begin with a presaging feeling (aura). When the seizure starts, loss of consciousness is instantaneous and all muscles are tensed in a tonic spasm. At the same time, air is often expelled from the lungs, resulting in a screaming utterance. Breathing stops and the patient turns blue. This phase usually lasts for a few seconds. After this the twitching phase begins: the patient's muscles twitch back and forth, foam often comes from the mouth and it may be red in colour if the patient bites his/her tongue or cheek. Urine and, sometimes, faeces can be released. During the seizure the patient does not react to pain. After this, the patient slowly returns to consciousness. This takes a few minutes.

In the case of status epilepticus, the seizures follow one after the other with no returning to consciousness between them. This is always a life-threatening condition, and the patient must be transferred for further treatment as soon as possible.

20 Eye problems and symptoms

There can be infections, functional disturbances, and structural or degenerative symptoms in the various parts of the eye. Sometimes eye symptoms are connected with other illnesses or they can be side-effects of, for instance, medical treatment.

1 Illnesses of the eyelids

The most typical illnesses of the eyelid are: stye, chalazion, infections and allergic reactions. The conjunctiva turns white in infections of the eyelid.

The proper treatment is to use eye salve containing chloramphenicol (10/B) 3 to 5 times a day. This is continued for two days after the symptoms have alleviated, but no longer than 10 days altogether.

An eye that secretes discharge is always cleaned with a cotton swab or ball dipped in clean water before applying the salve. If the problem is not over in 10 days, consulting a doctor through Radio Medical is recommended.

Stye and chalazion

A stye is an infection of the small sebaceous glands situated at the roots of the eyelashes. It sometimes appears as a small infected nodule on the edge of the eyelid. Sometimes the entire margin of the eyelid is swollen, red and tender. Later, a small abscess develops. It may erupt on its own in a couple of days.

A chalazion is a blockage of a gland on the margin of the eyelid. It usually appears as a hard lump, which can reach the size of a pea and usually is not tender to the touch. A small chalazion may go away by itself, a larger one needs to be removed surgically by a doctor.

Sudden infection of the margin of the eyelid

An infection of the margin of the eyelid is usually caused by bacteria. The margin of the lid is red and swollen, and discharge and crust form at the roots of the lashes. It may be difficult to open the eyes in the morning because of the encrustation. The eye should not be rubbed despite the possible itching caused by the infection.

2 Dry eyes

Blinking the eyes normally spreads a thin film of tear liquid on the surface of the eye, thus keeping the cornea and the conjunctiva damp and clean. The symptoms of dry eyes are a sensation of grittiness or itching and burning. The eyes feel dry, but they may also feel wet. The symptoms worsen in a room where the humidity is low or the air conditioning is very effective. The treatment is prescription-free artificial tears that are applied several times a day.

3 Red, itching and discharging eyes

In an infection of the conjunctiva both eyes are red and 'burning', and especially in the mornings discharging. An allergic infection of the conjunctiva is also often accompanied by a clogged nose and secretion of clear mucus, sneezing or other respiratory symptoms.

If the infection is caused by bacteria, it can spread by touching, and therefore the patient should be well instructed to take care of hand hygiene.

The eye should be cleaned. Chloramphenicol (10/B) eye drops or ointment is used for treatment. On the first day, the drops are applied once every hour. On the following days they are applied 4 to 6 times

a day. For the night the same medication can be applied as an ointment. The treatment is continued for 2 to 3 days after the symptoms have vanished.

Itching together with swelling and redness of the conjunctiva are typical symptoms of an allergic infection of the conjunctiva. The eyes are usually free of any discharge. The symptoms can be relieved with eye drops that constrict the blood vessels (tetrahydrozoline hydrochloride, 10/A). However, these are not suitable for long-term use. The allergic symptoms of the eyes can also be relieved by administering 10 mg of cetirizine hydrochloride (5/B) once a day.

4 Red eyes

Unusual redness of the conjunctiva can be caused by dilated blood vessels. If the eyes are bloodshot, but there are no other marked symptoms of the eyes, it is most likely that irritation is the cause of the dilation of the blood vessels. For instance, tobacco smoke or a dusty environment may be the reason for bloodshot eyes. No treatment is required, but the symptoms can be temporarily relieved with eye drops that constrict the blood vessels (e.g. tetrahydrozoline hydrochloride, 10/A).

By rubbing the eye, or during a fit of coughing, or even without any obvious reason, one of the fine blood vessels beneath the conjunctiva can rupture, causing haemorrhage. A clear, evenly red, asymptomatic pool of blood can be seen on the conjunctiva. This one-sided pool of blood will vanish on its own and requires no treatment. The blood will be absorbed within one or two weeks.

5 Redness and itching of the eye

One-sided redness, itching and a change in the ability to see with the affected eye may be caused by an acute rise in intraocular pressure, infection of the iris, or a wound on the surface of the cornea. Because the cause may also be a serious eye disease, consulting a doctor through Radio Medical is recommended.

Acute rise in intraocular pressure

A sudden rise in intraocular pressure is related to severe pain in the eye and bloodshot eyes. The cornea of the eye becomes clouded causing the vision in that eye to weaken. The pupil is dilated and does not contract in light. The patient is often nauseous and vomiting.

As first aid, eye drops containing pilocarpine hydrochloride (10/D) are administered every 10 minutes to make the pupil contract. Medication for pain and nausea can be given if necessary. The patient is instructed to see an ophthalmologist for further examination and treatment as soon as possible. Consulting a doctor through Radio Medical is recommended.

Sudden infection of the iris

The symptoms of a sudden infection of the iris are one-sided redness, dull pain in the eye area, pain in the eye itself, fuzzy vision and sensitivity to light. Bright light increases the pain. The pupil of the inflicted eye may be smaller.

If untreated, infection of the iris will lead to severe eye complications. The patient should be referred to an ophthalmologist for further examination and treatment when ashore. Consulting a doctor through Radio Medical is recommended.

21 Illnesses of the ear and the throat

Illnesses of the ear, nose and throat are very common. They tend to heal by themselves, and the use of antibiotic drugs should therefore be considered carefully. It is typical that in these infections the symptoms are similar regardless of whether they are caused by bacteria or by viruses.

1 Sore throat

Most throat infections are viral in origin. In these cases soreness of the throat is related to simultaneous symptoms of the common cold, e.g. coughing, a runny nose, and sometimes muscle soreness. Antibacterial treatment is ineffective against viral diseases.

Absence of a runny nose or coughing suggests bacterial infection. The tonsils of the patient with a sore throat may be covered with whitish plaques (Figure 21). Swelling and soreness of the lymph nodes on the neck also suggests bacterial infection. If the nodes are not sore, a viral infection is suspected. A bacterial infection is treated with antibiotics. Phenoxymethylpenicillin (660 mg/tbl, 7/A) is

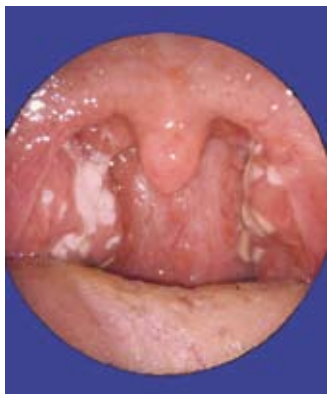


Figure 21. Tonsils coated with white plaques

given 1.5 tablets twice a day, or, in case of hypersensitivity to penicillin, one 150 mg tablet of doxycycline (7/B) once a day. The treatment should last 10 days.

Obvious swelling on one side of the pharynx together with severe pain in the throat, difficulties in speaking and in fully opening the mouth, are severe symptoms, and suggest the presence of an abscess in the throat (peritonsillar abscess). The condition is treated with antibiotic drugs (for dosage, see above). Consulting a doctor through Radio Medical is recommended.

- **Consult a doctor via Radio Medical**
- **if the throat is coated with white plaques and**
- **the patient is unable to swallow his own saliva, or**
- **cannot fully open his mouth because of throat pain.**

2 Hoarse voice

Sudden hoarseness of the voice is often caused by a viral infection of the larynx. Symptoms of the common cold are often present. The treatment is to rest the voice (talk as little as possible), to breathe hot steam and to take a cough mixture that inhibits coughing if necessary. Treatment with antibiotics should be considered if the symptoms persist for more than two weeks, or if other findings in the respiratory tract require it (e.g. strong suspicion of maxillary sinusitis). Smoking and the use of alcohol may prolong hoarseness of the voice.

3 Ear wax in the external ear

Ear wax helps protect the ear from infections, among other things. Sometimes so much wax accumulates that when inspected with an ear lamp, a reddish brown mass of impacted wax is visible in the outer auditory canal. There is no reason to remove the wax unless it causes symptoms. If the impacted ear wax blocks the auditory canal entirely, it may not only weaken the hearing, but also cause humming in the ear, and even vertigo. In this case removing the wax is recommended.

Impacted ear wax should not be removed with a cotton swab, as this may easily push the blockage even deeper into the auditory canal. The impacted wax can be softened with appropriate ear drops (wax-removing drops, 11/C). It is then easier to remove the wax by syringing the auditory canal. A softened blockage is removed by syringing the auditory canal with water at a temperature of 37°C. If the temperature of the liquid used differs from the temperature of the body, it will cause vertigo and nausea during the procedure. The procedure is repeated until the impacted wax is removed. The success of the procedure can be checked by examining the auditory canal with an ear lamp. If it is known that there is a hole in the ear drum, no water should be allowed into the auditory canal.

4 Water in the ear

After washing the hair or swimming, some water may remain in the ear. Usually the water can be removed by tilting the head and shaking it, or drying with a towel. If this does not seem to work, it is possible to try and remove the water by pouring a 40–60% solution of alcohol (e.g. vodka) into the auditory canal. The alcohol mixes with the water and the mixture dries faster than plain water. At the same time the

alcohol helps to disinfect the skin of the auditory canal.

If there is ear wax in the auditory canal, water can easily block the passage. In this case the treatment is to remove the wax as described above.

5 Itching of the ear

Itching of the auditory canal is a common problem. The cause may be a chronic infection of the auditory canal, for instance a yeast or other fungal infection. A rash may also be caused by irritation or by an allergic reaction. Despite the itching, picking the auditory canal should be avoided, as the thin skin of the canal can easily be ruptured, thus making the ear vulnerable to sudden infection. Repeated picking of the auditory canal can also prolong the itch.

Ear drops containing flumethasone-clioquinol (11/A) can be used as a medical treatment: three drops are dropped into the auditory canal while the patient is lying on his side. The drops are allowed to flow slowly deeper into the canal. This procedure is repeated 2 to 3 times a day. If the problem persists or recurs, examination and treatment by an ear specialist are recommended.

6 Pain in the ear

The cause of pain in the ear is usually an infection in the auditory canal or in the middle ear. The symptom in both cases is severe pain. In an infection of the middle ear, the pain is caused by liquid accumulating in the middle ear, causing the pressure to rise. The pain eases if the tympanic membrane ruptures and the pressure in the middle ear is relieved. In an infection of the auditory canal, the symptoms are caused by an infection of the skin of the auditory canal. Puss accumulates in the canal, the ear is sore, and there is deafness of the ear.

When the infection is in the middle ear, the tympanic membrane appears reddish, dull and swollen when inspected with an ear lamp. On the other hand, if the auditory canal is discharging, reddish and swollen, it is a case of an infection of the auditory canal.

The treatment for infection of the auditory canal is ear drops containing flumethasone-cliproquinol (11/A). If the condition is prolonged, and changes can be seen on the tympanic membrane of the afflicted ear, treatment with an antibiotic drug should be started. A 150 mg tablet of doxycycline is given once a day for 7 to 10 days. Pain-relieving ear drops (11/B) are poured into the auditory canal to ease the pain: 8 drops are dropped into the auditory canal every 4 hours while the patient is lying on his side. Orally administered pain medication helps to ease the symptoms.

Pain in the ear region can also be caused by an illness that is not related to the ear in itself. One-sided pain in the throat can radiate to the ear. The jaw joint is located immediately in front of the ear. Pain in the joint can be perceived as a problem in the ear. Infections of the salivary glands can cause pain in the ear area as well (e.g. in mumps).

Problems with the teeth and tension in the neck and shoulders can also be experienced as pain in the ear region.

7 Pain in the region of the cheek bones

A feeling of pressure and congestion in the cheek-bone region can be caused by a bad cold or by maxillary sinusitis. It is often impossible to tell the difference between the two without laboratory tests.

The symptoms of maxillary sinusitis are a runny or blocked nose, cough, local pain or soreness of the cheek, nasalization of the voice, tiredness, headache, sensation of pressure around the cheek bones, and the flowing of mucus into the throat.

In frontal sinusitis, the forehead is locally sore and sensitive to touch.

If the mucous membrane in the nose is swollen, it can be eased with a nasal solution (xylometazoline, 6/D): one squirt into the nostrils four times a day, but this treatment should not be continued for more than 10 days. If the symptoms are severe and the spray does not help within a couple of days, antibiotic treatment should be started: doxycycline (7/B), a 150 mg tablet is given once a day for 7–10 days.

8 Nosebleed

The most common causes of nosebleed are injury, infection, or rupturing of the blood vessels in the mucosa of the nose (e.g. due to picking the nose). Most often the bleeding originates from the upper front part of the nasal canal. The wound can often be seen when looking into the nose (an ear lamp is useful for this purpose).

First aid consists of bending the patient forward, which prevents the blood from flowing into the throat. Constant pressure is applied to the side of the bleeding nostril. A cold pack on the neck can also help by constricting the blood vessels in the nose. This in turn helps to stop the bleeding.

Constant pressure on the nostril for 15 to 20 minutes is usually sufficient to stop the bleeding.

If the bleeding does not stop, a cotton wad dampened with nasal solution (6/D) can be placed inside the nostril. It is kept there for 5 minutes and then removed. If the bleeding has stopped, a cotton wad soaked in bacitracin ointment (9/D) can be placed in the nostril for one or two days.

If the bleeding does not stop despite the above procedures, the cause can be a wound further back in the nose canal or in the nasopharynx. There may be a great deal of blood in the nasopharynx. Consulting a doctor via Radio Medical is recommended.

22 Problems of the mouth and the teeth

Problems of the mouth and of the teeth rarely require immediate treatment aboard ship. However, toothache, a broken or detached tooth or a dislocated jaw do require first aid aboard ship.

1 A Dislocated jaw

The jaw can be dislocated during yawning, for instance. The mandible (lower jaw bone) slips away from the articular surface of the maxilla (upper jaw) and the jaw is locked in an open position behind and above the articular surface. Closing the mouth is impossible. If the dislocation is only one-sided, the jaw appears crooked.

The treatment is to simply relocate the jaw. The patient is sitting down; the helper places his/her thumbs against the molars in the mouth, and supports the lower jaw with the other fingers. The jaw is pulled down until the mandible clicks into place as a result of the pull of the masticatory muscles (jaw muscles). The jaw often slips into place very suddenly, so the helper must be prepared that his/her thumbs will most probably be caught between the patient's teeth.

2 Toothache

Toothache is caused by an infection of the dental pulp, either because of caries or because of a broken tooth. The infection causes severe pain. There can also be an abscess at the root of the tooth. It may be seen as a swelling of the surrounding gum. The abscess may even erupt into the oral cavity.

The first aid for toothache is pain relief. One or two 50 mg tablets of diclofenac (3/B) are given 2–3 times a day.

For persons who are hypersensitive to acetylsalicylic acid, one (or two) 500 mg tablet of paracetamol (3/A) is given 2 to 4 times a day.

In the case of a bacterial infection in a tooth, a 660 mg tablet of phenoxymethylpenicillin (7/A) is administered three times a day. For those hypersensitive to penicillin, a 500 mg tablet of cefadroxil (7/E) is administered twice a day. The treatment is continued for 10 days. A dentist will repair the affected tooth on shore.

3 A detached tooth

A tooth that has accidentally come off should always be replanted if the jaw bone seems intact. The tooth is cleaned carefully in such a way that the surface of the root is not rubbed or unnecessarily touched. If the tooth is not replanted immediately, it can be preserved in milk or under the tongue until replantation.

The tooth can also be replanted immediately. The dental alveolus from where the tooth came out should be rinsed with saline (salt) solution, using a syringe to spray the solution into the alveolus. The tooth is then pressed into place. If it is not possible to visit a dentist, treatment should be started on board by giving the patient a 660 mg tablet of phenoxymethylpenicillin (7/A) three times a day or, in the case of hypersensitivity to penicillin, a 500 mg tablet of cefadroxil (7/E) twice a day. The patient should be referred to a dentist for further treatment as soon as possible.

4 A broken tooth

If a tooth is broken or chipped, the remaining part of the tooth can be protected with dental cement (14/A). If the dental pulp is

exposed, pain medication may be necessary because of the stabbing pain. The nature of further treatment given by a dentist depends on the severity of the damage.

5 Infected gum

If the teeth are not brushed regularly, tartar collects on the surface of the teeth and may cause an infection of the gums. The

symptoms are foul breath and bleeding of the gums in connection with brushing. A prolonged infection leads to decay of the attachment apparatus, loosening of the teeth, and finally their detachment. The prevention and treatment of this infection on board includes careful brushing of the teeth and cleaning of the spaces between the teeth with a tooth pick or tooth floss. Further treatment is done by a dentist.

23 Chest pain and cardiovascular diseases

The causes of chest discomfort or pain may be completely harmless, or they may be rapidly life-threatening. It has to be kept in mind always that the cause of chest pain may be coronary artery disease. On the other hand, severe chest pain may be an indication of a ruptured aortic aneurysm, inflammation of the heart muscle, pulmonary and musculoskeletal diseases and gastrointestinal diseases, as well as psychological factors.

A patient complaining of chest pain should always be taken seriously. Finding out valuable background information about the case makes consulting Radio Medical easier. The background information includes documenting when and in what circumstances the symptoms began, and how they developed. In addition, examining the patient's general condition, skin colour and skin temperature, pulse, blood pressure, body temperature and other possible symptoms is important.

1 Caring for a patient suffering from chest pain

The aim of first aid is to alleviate the patient's symptoms and to increase the chances of survival.

Treatment:

- place the patient in a half-sitting position
- deliver oxygen with a mask
- give pain medication
- give nitroglycerin
- give acetylsalicylic acid.

● Consult Radio Medical.

Reassuring and positioning the patient

The patient is placed either in a half-sitting or in a lying position. Oxygen is administered with a mask. A peaceful environment and calm behaviour help to reassure the

patient. Continuous observation of the patient's general condition makes it easier to notice rapid changes in the patient's condition. Speaking in a reassuring manner with the patient also helps the patient to feel safe.

Pain medication

Diclofenac (3/B) as a 100 mg suppository or as a 3 ml intramuscular injection can be administered 3 times a day to alleviate pain. (Not to be given to patients allergic to acetylsalicylic acid!)

A patient who is clearly unwell and suffering from severe chest pain of suspected cardiac origin should immediately be given morphine (20 mg/ml, 3/C), for example, a dose of 0.2–0.6 ml intravenously, intramuscularly or subcutaneously. Morphine can be given repeatedly, but it must be noted that large doses can weaken breathing.

Nitroglycerin and acetylsalicylic acid

If the patient's blood pressure is over 100/60 mmHg, a nitroglycerin tablet can be administered under the tongue to alleviate cardiogenic chest pain. Nitroglycerin dilates the coronary vessels, improving the flow of oxygen to the heart muscle. A heart attack or other illness causing chest pain is suspected if four nitroglycerin tablets, administered one at a time at 3–5-minute intervals, do not help.

In addition, three 100 mg tablets of acetylsalicylic acid (1/B) should be given to the patient to be chewed if he/she is not allergic to acetylsalicylic acid. A small amount of acetylsalicylic acid works as an anticoagulant, inhibiting platelet binding and blood clotting.

Other treatment

Diazepam (4/A) has a sedative effect, alleviating apprehension and anxiety. One or two 5 mg tablets of diazepam can be given at a time. The patient needs to be

monitored and observed carefully. Pulse and blood pressure should be taken regularly. If the patient experiences severe chest pain, it is always necessary to consult a doctor via Radio Medical.

2 Causes of chest pain

Coronary disease

Coronary artery disease develops when the coronary arteries which supply fresh blood to the heart muscle, become narrowed. This usually takes many years or even decades. A typical symptom is a pressing or smarting pain (angina pectoris) felt behind the breastbone during physical or mental stress. The pain often radiates to the left arm, but it can also spread to the neck, jaw and upper extremities or between the shoulder blades. The pain usually lasts for a few minutes and is relieved by rest and nitroglycerin medication.

Heart attack

A heart attack (myocardial infarction) occurs when a coronary artery suddenly becomes obstructed. An obstruction usually develops in an artery that is already narrowed. When the left or right coronary artery is occluded, a sudden decrease in cardiac output or a disturbed heart rhythm may lead to sudden death.

The most common symptom of a heart attack is intense pain. The pain is similar to angina pectoris but more intense. The pain also lasts for more than 20 minutes. Rest and nitroglycerin medication give only little relief.

Other signs and related symptoms of a heart attack include nausea, vomiting, shortness of breath and excessive perspiration. Widespread damage to the heart muscle may lead to rapidly progressing cardiogenic shock. The patient becomes pale and the skin feels cold and clammy. The blood pressure drops and the pulse becomes frail.

3 Other cardiovascular diseases

Congestive heart failure

The most common diseases that cause congestive heart failure are hypertension and coronary artery disease. Congestive heart failure may develop in a previously healthy person during, e.g. a severe inflammation of the heart muscle, or during pregnancy.

Sudden heart failure causes pulmonary oedema, i.e. accumulation of fluid in the lungs. The symptoms include difficulty in breathing even at rest, cold bluish skin, and a rapid pulse. The veins of the neck area are often distended. The patient's breathing becomes wheezy and his/her sputum may be foamy. Pulmonary auscultation with a stethoscope reveals râle in the lungs.

Sudden pulmonary oedema is always an emergency situation. After rapid assessment, a doctor must be contacted and the patient should be hospitalized as soon as possible. The patient is placed in a half-sitting position and oxygen is delivered via a mask. A diuretic, for example, furosemide (1/C) can be administered 10–20 mg (1/2 –1 ampoule) intravenously. Also 0.2–0.3 ml of morphine (20 mg/ml, 3/C) can be administered intravenously or subcutaneously. If the patient's blood pressure is over 100/60 mmHg, a 0.5 mg nitroglycerin tablet (1/A) can be placed under the tongue.

Disorders of heart rhythm

Most arrhythmias are harmless. Heavy smoking and drinking of coffee, as well as staying up very late or having a hangover, may provoke arrhythmia. Arrhythmias are often symptom-free, but they can also be unpleasant chest sensations or 'missing heart beats'. If arrhythmias occur mainly at rest and not during physical strain, they are usually harmless and require no medical attention. If arrhythmias cause persistent

discomfort, a metoprolol tartrate tablet (1/D) 25 mg can be given 1–2 times a day.

A heart rate over 100 or even 300 beats per minute is abnormally fast. Very often this kind of tachycardia is a sign of heart disease or some other illness, such as hypersecretion of thyroid hormone. Selecting suitable medication requires consulting Radio Medical.

Atrial fibrillation is a relatively common form of tachycardia. The typical symptoms are palpitation, disturbed heart rhythm, weakness and chest pain – especially when the heart rate is very rapid. The treatment includes administration of one 25 mg tablet of metoprolol tartrate (1/D) 1–2 times a day. Consulting Radio Medical is necessary if the condition does not improve.

Ventricular tachycardia and ventricular fibrillation are life-threatening arrhythmias. The underlying problems are coronary artery disease, acute myocardial infarction, or diseases of the heart muscle. In ventricular fibrillation, the heart is unable to pump blood adequately. The patient suddenly loses consciousness, stops breathing, and the pulse is not palpable. The condition is fatal unless cardiopulmonary resuscitation is started immediately.

A slow heart rate or bradycardia may cause dizziness, faintness, weakness, chest pain, and even convulsions, or sudden loss of consciousness. It is necessary to consult Radio Medical before administering any drug, and the patient must be transported to hospital.

High blood pressure and hypertensive crisis

There are no immediate symptoms in high blood pressure or hypertension. In the long run, hypertension damages the internal organs, e.g. the heart and kidneys, and may cause diseases such as coronary artery disease, congestive heart failure, renal failure, or a stroke.

If repeated blood pressure measurements, carried out unhurriedly in a peaceful environment, show a systolic pressure of > 150 mmHg and a diastolic pressure of > 90 mmHg, the patient may need antihypertensive medication and should be referred for further care. However, the first step is to pay attention to both dietary intake and life-style. The patient should eat less salt, lose weight, exercise, stop smoking and drink less alcohol. Also stress can raise blood pressure.

The patient may suffer from a hypertensive crisis or severe elevation of blood pressure when the diastolic pressure repeatedly exceeds 120 mmHg, and if he/she also has headache, convulsions, stroke symptoms or symptoms of congestive heart failure. In addition, the patient may be confused and drowsy. A hypertensive crisis can progress rapidly and may be fatal. Radio Medical should be consulted about the treatment aboard ship, and the patient must be transported to a hospital as soon as possible.

Low blood pressure

Low blood pressure or hypotension as a single finding is harmless in a healthy person and requires no medical attention. If there are additional problems, such as chest pain or an allergic reaction, the condition may lead to shock. In that case, urgent medical attention is required.

Diseases of the venous circulation

Superficial varicose veins can be seen as dilated and tortuous veins on the calves and thighs. Varicose veins are treated with surgical stockings and bandages. Elevating the limb eases the symptoms temporarily. Surgery is the treatment of choice for most patients.

Superficial venous inflammation

Superficial venous inflammation, phlebitis, is usually related to varicose veins. Phlebitis can be felt as tender, warm and

striated swelling under the skin, usually on one leg. There is local redness on the skin, and the patient's temperature may be slightly elevated. Phlebitis is most often harmless, and sufficient treatment is a painkiller. In addition, a cold compress can be applied to ease the symptoms.

Deep venous thrombosis

An occlusion, caused by a blood clot, may develop in the deep veins of the calves. Predisposing factors are, for example, the sedentary position of a leg when in a plaster cast, a long bed rest e.g. after an operation, a long trip in an aeroplane, and smoking.

The symptoms of deep venous thrombosis include unilateral pain and swelling which develops during several hours or days, difficulty in walking, and soreness of the calf when pressed gently. Usually the affected calf is warmer than the healthy one. Superficial veins may be markedly visible, and the whole limb may be flushed. The higher the thrombosis reaches, the more swollen the limb is. The most severe consequence of a deep venous thrombosis is pulmonary embolism, which is often life-threatening.

First aid includes elevating the leg and resting it. Give three acetylsalicylic acid tablets (3 x 100 mg, 1/B) if the patient is not allergic to this drug. It is forbidden to massage the leg. Consult a doctor via Radio Medical. A patient suspected of suffering from deep venous thrombosis always requires examination by a doctor and treatment in a hospital.

Pulmonary embolism

Sometimes blood clots are detached from the deep venous thrombosis. The clots are transported by the blood stream to the heart and lungs where they block pulmonary vessels.

The symptoms of pulmonary embolism are sudden or rapidly worsening shortness of breath, chest pain, tachycardia, low blood pressure, cold, clammy and

cyanotic (bluish) skin, restlessness, pain and impaired consciousness. The condition is life-threatening and requires urgent medical attention.

First aid includes placing the patient in a resting position and administering oxygen via a mask. Strong painkillers, such as morphine, alleviate the pain and the sense of oxygen deprivation. Morphine can be given, for example, in 6 mg doses intramuscularly, or slowly via an intravenous cannula. Consult a doctor via Radio Medical and evacuate the patient from the ship as soon as possible.

4 Diseases of arterial circulation, arterial thrombosis

Arterial thrombosis of a leg can be caused by a ruptured atherosclerotic plaque or a blood clot formed in the heart. The condition progresses rapidly. Sudden, intense pain is felt in the affected leg. The distal part of the leg turns cold and blue and no pulse can be felt. The cessation of circulation in the leg requires urgent medical attention, because there is a great risk of losing the leg.

24 Difficulty in breathing

Difficulty in breathing is a sign of inadequate oxygenation. It may be caused by narrowed airways due to, for example, a foreign body in the airways, allergic reaction, inflammation, or toxic gases. Another cause may be impaired functioning of the lungs due to inflammation or a collapsed lung. The diminished oxygen transfer capacity of blood, caused by decreased blood volume (bleeding) or weakened stroke volume of the heart (congestive heart failure), leads to oxygen deprivation, resulting in breathing difficulties. Severe lack of oxygen may cause blueness (cyanosis) of the face and especially lips, and laboured breathing, even at rest.

● Causes of breathing difficulties:

- foreign body in the airways
- allergic reaction
- pneumonia
- collapsed lung
- bleeding
- congestive heart failure.

If the patient experiences difficulty in breathing, reassure him/her about the situation and place him in a sitting position. Administer oxygen via a mask to improve oxygenation. The cause of the breathing difficulty must be clarified, and appropriate measures must be taken immediately. If the condition is severe, prepare for resuscitation. After giving first aid, it is always necessary to consult a doctor via Radio Medical.

1 Sudden difficulty in breathing

If sudden breathing difficulties occur during a meal, always suspect airway obstruction due to a piece of food clogged in the windpipe. The signs are sudden and severe difficulty in breathing, or complete cessation of breathing. The patient is usually unable to speak. At first, the patient can be given sharp slaps between the shoulder blades in order to remove the foreign body from the windpipe. If this does not help, try

abdominal thrusts, the so-called Heimlich manoeuvre. If this fails, try to remove the foreign object with the fingers (see Chapter 2 Foreign object in respiratory tract).

2 Breathing difficulties within minutes

Anaphylactic or allergic reaction

Narrowed airways may result from an allergic reaction, which is always treated with 0.5–1.0 ml of adrenaline (1 mg/ml, 8/A) administered subcutaneously. If shock is developing, adrenaline can be injected directly into the tongue to hasten absorption (see Chapter 4 Shock). After this, 2 ml of hydrocortisone (125 mg/ml, 5/C) is administered either intramuscularly or intravenously.

Asthma attack

Difficulty in breathing may be caused by an asthma attack. The patient's breathing becomes wheezing as he/she breathes out and, in a severe attack, he/she can speak only with difficulty. First, have the patient inhale salbutamol aerosol (0.2 mg/spray, 6/A) 1–3 sprays. Second, administer 125 mg of hydrocortisone (125 mg/ml, 5/C) intramuscularly at 4-hour intervals, if necessary. Third, if the condition does not improve, give 0.5 mg of adrenaline (1 mg/ml, 8/A) subcutaneously. Finally, consult a doctor via Radio Medical.

3 Breathing difficulties developed within hours

Slowly developing difficulty in breathing can be caused by an inflammation or a collapsed lung. Cardiovascular causes are, for example, heart attack and congestive heart failure. Hyperventilation, i.e., unnaturally fast and deep breathing, is a common manifestation of psychic disorders, like panic attacks. Hyperventilation can also resemble a condition in which the body lacks oxygen. Thus the cause of

the breathing difficulty and the required treatment can vary significantly. Therefore, consulting a doctor via Radio Medical is often necessary.

Pulmonary auscultation should be performed, because a condition that has developed within hours usually does not require immediate care. Special attention should be paid to the breath sounds during inhalation and exhalation. The sounds of breathing should be similar in both lungs. If they differ, there is something wrong. If breath sounds cannot be heard at all from one of the lungs, this is a sign of an inflammation or a collapsed lung (pneumothorax).

A difference in the breath sounds between the left and right lung is always a sign of an abnormality. A doctor should be consulted via Radio Medical.

Possible chest pain can be identified by gently pressing and tapping the chest area. Chest pain may explain symptoms such as difficulty in breathing, e.g. due to a fractured rib.

Pneumonia or inflammation of the pleural sack

The signs and symptoms usually include fever, cough, increased secretion of phlegm, and one-sided chest pain. The condition is treated with an antibiotic, phenoxymethylpenicillin (660 mg / tablet, 7/A), at a dose of one tablet three times a day. The patient who is allergic to penicillin can be given doxycycline (7/B), one 150 mg tablet daily, for 10 days. In addition, medication can be given to ease pain and fever. Consult a doctor via Radio Medical if pneumonia is suspected.

Spontaneous pneumothorax

Pneumothorax can occur spontaneously without an identifiable reason. However, it is often caused by a trauma, for example, a fractured rib. The broken bone can injure a lung and allow air to escape into the pleural sack. As a result, the lung collapses.

Spontaneous pneumothorax often begins with sudden one-sided pain and difficulty in breathing of variable severity. The breathing difficulty becomes more obvious during physical strain. The patient has no fever or cough. Breath sounds on the af-

ected side are silent or non-existent.

Treatment aboard ship consists of rest and pain medication. Consult a doctor via Radio Medical. The condition is life-threatening and the patient should be hospitalized as soon as possible.

25 Diseases of the airways

Diseases of the airways are most commonly accompanied by cough and increased secretion of phlegm. The purpose of cough is to remove foreign material from the lower respiratory passages (bronchi and lungs). Besides pulmonary diseases, cardiovascular and musculoskeletal problems (ribs, muscles between the ribs) can also provoke chest discomfort. In addition, diseases of the abdominal region can be manifested as symptoms felt in the chest.

1 Patient assessment

Always interview the patient about the development and duration of his/her current airway symptoms and possible history of similar problems. Auscultate the lungs and note the audibility and symmetry of the breath sounds and possible r le. Measure the patient's body temperature.

If the airway symptoms persist for over three days, or if the patient has breathing difficulties, wheezing or fever, consult a doctor via Radio Medical.

● **If the following symptoms occur, consult a doctor via Radio Medical:**

- **difficulty in breathing**
- **fever (over 39 C)**
- **wheezing breath sounds**
- **asymmetrical breath sounds**
- **severe chest pain**
- **bloody or green phlegm.**

2 Treatment

It is not necessary to restrain coughing if it helps to loosen phlegm. Bromhexine (8 mg/tbl, 6/C), 1–2 tablets three times a day can be given to ease expectoration. The treatment should not be continued for over two weeks, because the medicine will start to induce mucus secretion and may thus prolong the symptoms. A dry, barking cough is harmful. It can be treated with a cough mixture containing antitussive (6/B).

Coughing irritates the airways and may narrow them. This may cause wheezing and laboured breathing, which are treated with salbutamol (6/A), one 2 mg tablet three times a day, or two inhalations (0.2 mg/inhalation) at 4-hour intervals.

If the patient's general condition is poor or is weakening, or if the phlegm becomes thick and green, antibiotic medication should be started. For a non-smoker, administer one tablet of phenoxymethylpenicillin (660 mg/tablet, 7/A) three times a day. For a smoker or a patient allergic to penicillin, administer one 500 mg tablet of cefadroxil (7/E) twice a day, or doxycycline (7/B), one 150 mg tablet once a day. The medication is taken for 7–10 days.

If antibiotics do not ease the symptoms within a couple of days, consult a doctor via Radio Medical.

When the patient's condition has improved, consider transferring him for

medical and lung examinations. The risk of tuberculosis must be kept in mind, especially if the member of the crew comes from a country where tuberculosis is common.

3 Diseases of the airways

Common cold and influenza

The common cold is a viral inflammation of the upper respiratory tract. The symptoms include a moderate rise in body temperature, runny nose, cough, muscle aches and general malaise.

Influenza epidemics appear in the wintertime. Influenza causes a stronger inflammation of the airways than common cold. The signs, fever, cough, muscle aches and general malaise usually last 5–7 days.

These viral infections are treated according to the symptoms (rest and medication for easing the pain and lowering the temperature). Rest is recommended until the body temperature is normalized, even 6–7 days. Sinusitis, pneumonia or bronchitis may occur as complications.

Bronchitis

Acute bronchitis is usually caused by a virus. At first, the symptoms resemble those of the common cold. After a few days, other symptoms ease, but cough, increased phlegm secretion, and even a feeling of pressure on the chest persist. Often the patient has fever. At first, the phlegm is clear, but later on, as bacteria become involved, it may turn greenish, brownish or yellow.

The patient with bronchitis requires basic care. Medicine for cough, pain and fever can be given, if necessary. If the condition persists or the patient has a high fever or poor general condition, start antibiotic treatment (see above, Section 2 Treatment). Consult Radio Medical, especially if the patient's general condition is poor. A medical check-up is often necessary on shore.

Pneumonia

Pneumonia may develop within a few hours. Typical symptoms include cough, coloured or bloody sputum, difficulty in breathing, fever and often one-sided chest pain that worsens on breathing. Bacterial pneumonia is often accompanied by a rapidly weakening general condition. Viral pneumonia may develop more slowly, within a few days.

Auscultation of the inflamed lung areas may reveal dry r le, but often the breath sounds may be normal.

Antibiotic medication should always be started in cases of suspected pneumonia (see above, Section 2 Treatment). In addition, diclofenac (3/B) one 50 mg tablet 2–3 times a day, can be given to relieve aches and to lower the temperature (not suitable for patients allergic to acetylsalicylic acid!). Alternatively, one 500 mg tablet of paracetamol (3/A) can be given three times a day.

If the condition does not improve within 3–4 days, consult a doctor via Radio Medical. A medical check-up, including lung examination, should always be performed after pneumonia, especially as pneumonia may be the first sign of tuberculosis or lung cancer.

Asthma

Asthma is an inflammation of the bronchial mucous membranes. It causes spasms in the bronchioles and thus difficulty in breathing.

The first symptoms of asthma are usually cough and wheezing sounds during exhalation. Later on, difficulty in breathing, increased mucus secretion and yellowish sputum, may appear. These symptoms often appear in connection with other airway inflammations. The symptoms include wheezing cough at night, and difficulty in breathing during physical strain. Dust and smoke induce the symptoms. Sudden asthma attacks aboard ship commonly occur during physical strain or in

connection with an airway inflammation (see Chapter 24 Difficulty in breathing).

When asthma worsens, the rate of breathing increases, coughing starts, and wheezing sounds can be heard during exhalation even without a stethoscope. The patient may experience a shortage of air and difficulty in breathing. As a result, the fear of suffocation may provoke hyperventilation, deep and rapid breathing, which only worsens the condition.

An asthma attack is treated with 1–2 inhalations of salbutamol aerosol spray (0.2 mg/inhalation, 6/A). The patient often finds it easier to sit leaning forward. If these measures do not help, an injection of 125 mg of hydrocortisone (125 mg/ml, 5/C) is given intramuscularly. Both medications can be given again after 3–4 hours. If possible, oxygen is delivered via a mask. If the condition persists, give 0.5 mg of adrenaline (1 mg/ml, 8/A) subcutaneously. After giving first aid, consult a doctor via Radio Medical.

Chronic bronchitis and chronic obstructive pulmonary disease

Sputum secretion is typically increased in chronic bronchitis. Often many of the alveoli in the lungs have been destroyed and, as a result, the lungs have become distended (emphysema). Over 90% of emphysema cases are caused by smoking. The symptoms often begin with so-called smoker's cough and become more severe as the years go by. It is essential to stop smoking before severe and irreversible lung damage results.

Tuberculosis

TB, or tuberculosis, is a disease caused by bacteria called *Mycobacterium tuberculosis*. Although the bacteria can attack any part of the body, they usually attack the lungs. The symptoms include cough that is worse in the morning (sometimes with haemoptysis, blood in the sputum), chest pain, breathlessness, night sweats, and signs of pneumonia. In advanced disease, there may be extreme weight loss.

TB bacteria are conveyed by the air from one person to another. When a person with TB coughs or sneezes, the bacteria spread into the air, and the people nearby may breathe in these bacteria and become infected.

SARS

Severe acute respiratory syndrome (SARS) is a viral respiratory illness caused by a corona virus, called SARS-associated corona virus (SARS-CoV). SARS generally begins with a high fever (temperature over $>38.0^{\circ}\text{C}$). Other symptoms may include headache, an overall feeling of discomfort, and body aches. Some people also have diarrhoea. After 2 to 7 days, SARS patients may develop a dry cough followed by pneumonia.

SARS seems to be spread mainly by close person-to-person contacts. The virus that causes SARS is thought to be transmitted most readily by respiratory droplets (droplet-spread) produced when an infected person coughs or sneezes. The virus also can spread when a person touches a surface or object contaminated with infectious droplets and then touches his or her mouth, nose, or eye(s).

26 Vomiting, fever and diarrhoea

Nausea, vomiting and fever are signs associated with a range of illnesses, inflammations and infectious diseases. Diarrhoea often occurs in inflammations of the intestines, but it is not necessarily caused by an infectious disease. The illness causing the symptoms should be identified in order to treat it properly.

1 Nausea and vomiting

Reasons for nausea and vomiting

The most common reasons for nausea and vomiting are probably a viral infection and travel sickness or sea sickness. Vomiting can also be caused by a severe or even life-threatening illness, for example, inflammation of the intestines or appendix, intestinal obstruction, incarcerated hernia, meningitis, increased pressure inside the skull, or drug, alcohol or other poisoning.

● **Reasons for nausea and vomiting:**

- **viral inflammation**
- **sea sickness**
- **drug, alcohol or other poisoning**
- **appendicitis, intestinal obstruction**
- **increased pressure inside the skull.**

Intense vomiting may rupture the vessels of the mucous membrane that lines the oesophagus, making the vomit bloody. If the patient has impaired consciousness or is lying down, there is a risk that he/she may aspirate the stomach contents into the lungs, which will cause an obstruction of the airways or severe pneumonia.

Treatment

The cause of the vomiting should be identified and treated. Possible dehydration should be treated by giving the patient plenty to drink. Vomiting can be restrained by giving metoclopramide hydrochloride

(2/C) three times a day in the form of tablets, suppositories or injections. If the condition persists, consult a doctor via Radio Medical!

● **Consult a doctor via Radio Medical if nausea is accompanied by**

- **head or gastrointestinal trauma**
- **impaired consciousness or disorientation**
- **severe stomach ache or swelling of the stomach**
- **bloody or coffee-coloured vomit**
- **fever over 39°C**
- **or if the nausea persists for over 24 hours.**

2 Fever

Fever (arm pit temperature exceeding 37.5°C) is associated with inflammations of the body, for example, pharynx and other airway infections, urinary tract infections, herpes, erysipelas, etc. Body temperature may fluctuate from high to normal, or even below normal as in malaria and blood poisoning. Record the body temperature and its possible fluctuations, because it may be the only sign of malaria.

The cause of fever can usually be identified by observing the other symptoms. Consult a doctor if the fever persists for over 2–3 days. Consultation is also necessary if a previously healthy adult has a body temperature of 39°C or more.

● **Consult a doctor via Radio Medical if the fever continues for more than three days or exceeds 39°C.**

As we now know, lowering the fever has no effect on the duration or progression of an illness, but it makes the patient feel better. The adult patient can be given one

or two 500 mg tablets of paracetamol (3/A) three times a day to lower a high body temperature.

3 Diarrhoea

Diarrhoea means frequent emptying of the bowels and loose stools. The most common causes of diarrhoea are viruses, bacteria and food poisoning. Viral diarrhoea usually spreads easily, causing symptoms at different times and even on different days in different people. The symptoms appear almost simultaneously in the people who have eaten the same contaminated food.

Record the onset of diarrhoea, the number of defecations per day, and the colour of the stools. Ask the patient if there is bright red blood in the stools. Black stools may indicate intestinal bleeding (blood turns black when passing through the intestines). Black stools may also be caused by eating foods such as blueberries and liquorice. Bright red blood in the stools has usually bled from haemorrhoids. The reason for the presence of black or red stools must be cleared up in a medical examination whenever possible.

- **Consult a doctor via Radio Medical if**
 - **there is blood or mucus in the stools**
 - **the stools are black**
 - **body temperature exceeds 39°C**
 - **there is severe abdominal pain or swelling**
 - **the patient is severely dehydrated**
 - **diarrhoea persists for more than three days.**

An adult normally requires several litres of fluids per day. In a warm climate the need for fluids increases considerably. Diarrhoea, sweating, and possible vomiting, drastically increase the need for fluids, which may rise to even 10 litres a day.

Treatment

Dehydration

When treating diarrhoea, the most important measure is to replace fluid loss. Measuring the patient's weight is an easy way to estimate fluid loss and the need for fluids.

The following drink recipe for treating diarrhoea can be tried aboard ship:

- 1 teaspoon of salt
- 2–3 tablespoons of sugar
- dash of orange juice
- 1 litre of water.

The World Health Organisation's drink recipe can also be tried:

Add to one litre of boiled water

- 3.5 g of table salt (NaCl) = about one generous teaspoon
- 1.5 g of potassium chloride (KCl) = about one level teaspoon
- 20 g of white sugar = about 7 level teaspoons
- 2.5 g of sodium bicarbonate (NaHCO₃) = about one level teaspoon.

Medical treatment

Diarrhoea can be treated with loperamide hydrochloride (2/F). Give an initial dose of two capsules, followed by one capsule after each bowel movement. The amount of loperamide hydrochloride should not exceed 8 capsules a day.

Antibiotic drugs are ineffective if the diarrhoea is caused by a virus, or by food poisoning in which case the diarrhoea begins after a few hours.

Consult Radio Medical if the condition of an adult diarrhoea patient does not improve in a couple of days, or if the patient vomits or has a high body temperature for over 24 hours. If consultation is not possible, start antibiotic medication with two 250 mg tablets of ciprofloxacin (7/C) twice a day. The treatment should be

continued for four days after the symptoms have disappeared.

The patient's condition must be monitored carefully. Preventing dehydration is essential in the treatment of diarrhoea. If diarrhoea persists or the symptoms are severe, consult a doctor via Radio Medical.

Part of the microbes which cause diarrhoea may remain in the body. The patient may be symptom-free, but can still spread the disease. That is why people who handle unpacked food products must be sent for laboratory tests after an episode of diarrhoea.

4 Illnesses causing diarrhoea

Viral diarrhoea

It is typical to viral diarrhoea that people fall ill one by one on successive days, as the infection spreads from one person to another. The incubation time, i.e. the time from infection to the appearance of symptoms, of viral diarrhoea is usually 1–2 days. The symptoms include sudden, intense vomiting, watery diarrhoea, and possibly fever. The infection is over in 1–2 days.

Viruses can spread via droplets without contaminated food or water. Viral infections spread easily aboard ship, because people live close to each other. Widespread diarrhoea epidemics may occur particularly on a passenger ship where the infection spreads among the passengers and the crew.

Food poisoning

The so-called yellow staphylococcus bacteria thrives in heat-processed and salted foods, like smoked fish and ham. As the bacteria grow, they secrete toxins which cannot be removed by cooking or heating.

Symptoms appear ½–8 hours after the meal, and usually disappear in about 24 hours. The toxins have a direct effect on the central nervous system (CNS) causing

vomiting, which is a typical sign of food poisoning. Other symptoms include nausea, fatigue and general malaise. The sudden onset of the disease and strong symptoms including CNS symptoms make food poisoning a particularly serious event if, for example, the entire crew responsible for controlling the ship fall ill at the same time.

Salmonella

Diarrhoea can be caused by salmonella bacteria as they grow on the inner surface of the intestines. Faeces are also contaminated with salmonella bacteria and if the patient ignores personal hand hygiene, other people are in danger of infection.

The clinical picture ranges from symptom-free disease carrying to poisoning with a wide range of symptoms. Common symptoms are diarrhoea, vomiting and possibly fever. The time between becoming infected and the appearance of symptoms (incubation time) is 12–24 hours. The symptoms disappear in 2–5 days. Even if the symptoms usually disappear spontaneously within a few days, the patient may remain a disease carrier for a long time. In other words, the patient may spread a contagious disease even if he/she is symptom-free. Therefore, the patient should give a stool sample to verify the absence of the disease at the latest when he/she returns home. This is particularly important if the patient has handled unpacked food products.

Shigella

Shigella is a bacterial inflammation of the intestines. It is transmitted via food or water contaminated by faeces. Salads are common sources of the infectious agents when travelling abroad. Shigella bacteria produce toxins in the intestines, causing severe bloody diarrhoea and fever. Intestinal cramps and pain are also typical. However, vomiting is not a usual symptom. The incubation period is 1–4 days.

Yersinia

Yersinia and salmonella bacteria cause very similar inflammations. The symptoms include fever, severe abdominal pain and diarrhoea. An adult patient may, however, have only mild symptoms. Yersinia infection can be ascertained by laboratory tests, if complications such as joint pain appear.

Cholera

Cholera is an intestinal illness caused by a bacterium called *Vibria cholerae*. The

symptoms are diarrhoea, vomiting and leg cramps. It spreads mainly via drinking water that is contaminated with the bacteria.

Diarrhoea and vomiting begin 2–5 days after the infection. The faeces are often watery, described as ‘rice boiling water’. The patient may lose large amounts of fluids, as much as one litre per hour, leading to dehydration which can cause shock and death. Fluid replacement is extremely important and must be started after the first symptoms show up.

27 Constipation and haemorrhoids

1 Constipation

Constipation is a disorder of the bowel movement, which reduces the frequency of defecation or makes it laborious. Normally, defecation occurs every 8–72 hours. Constipation is often accompanied by stomach ache and swelling, as well as flatulence and pain in the rectum.

Causes

The most common causes of constipation are lack of exercise and inadequate fibre and fluid intake. Also medications or organic changes, such as tumours, can sometimes cause constipation.

Treatment

In temporary constipation, medication can be used to stimulate bowel movements. The patient is given one to three 5 mg tablets of bisacodyl (2/D) in the evening, enabling the patient to defecate in the morning. A sodium citrate enema (2/E) can also be given by inserting one tubeful as deep as possible into the rectum. The patient will then defecate in 5–15 minutes.

In the case of chronic constipation, the above type of medication is not suitable. The most important form of treatment then is to increase the amount of fibre and fluids in the diet. Exercising more will also facilitate bowel movements. Keeping to regular meal times and defecating times often improves the condition.

2 Haemorrhoids

Haemorrhoids (or piles) are abnormally enlarged veins in the walls of the rectum and anus. Internal haemorrhoids are situated on the bowel side of the sphincter muscle and appear only when straining to defecate. External haemorrhoids are found in the region of the sphincter muscles and can normally be seen protruding from the anus as purple bulges.

Symptoms

The symptoms are a feeling of pressure around the anus, itching and hygiene problems. Pain is typical to clotted haemorrhoids. The most common symptom is bleeding, which is noticeable during and

after defecating. The bright red blood stains can smear underwear or toilet paper after defecating.

Treatment

Asymptomatic haemorrhoids do not require treatment. Good personal hygiene is nevertheless needed in the treatment of symptomatic ones. To alleviate the

symptoms, prednisolone cinchocaine hydrochloride cream or suppositories (2/G) can be used three times a day until the condition improves. Treating constipation and flatulence is part of treating and preventing haemorrhoids. Widespread and symptomatic haemorrhoids can be removed surgically.

28 Abdominal pain

Most abdominal pains are harmless or, at least, do not require immediate medical attention. They can be treated aboard ship with the available medication. However, some acute abdominal problems are potentially life-threatening and require immediate surgery or other treatment in hospital.

It is difficult to estimate the severity of the situation when the symptoms begin. Intense pain caused by intestinal cramps due to sudden diarrhoea may be harmless, whereas mild pain may be symptomatic of a severe problem, such as appendicitis. Observing the progression of the condition is therefore important. The cause of pain can usually be determined within 24 hours. The severity of the condition as well as the possible need for further care on shore can then be estimated. It is often necessary to consult a doctor via Radio Medical.

1 Signs and symptoms

Vomiting is a common sign of both mild and severe abdominal illnesses. The severity of the condition can be determined on the basis of the intensity of vomiting, the amount and quality of vomit and, above all, other possible symptoms. Sea sickness is usually recognizable. The possibility of

food poisoning or a viral disease should also be considered. In addition, excessive use of alcohol may cause vomiting. Pyloric stenosis, that is, occlusion in the lower orifice of the stomach, may also cause vomiting. This situation may be caused by a tumour or scarring due to chronic ulceration. The condition is quite rare and causes vomiting which does not cease until the occlusion is surgically removed.

Dehydration is avoided by giving the patient small amounts of fluid at a time. Solid food is given when the condition has improved (see also Chapter 26 Vomiting, fever and diarrhoea > Nausea and vomiting > Treatment).

The reason for diarrhoea is usually unsuitable food, food poisoning, or a harmless viral inflammation of the gastrointestinal tract, gastroenteritis. Mild diarrhoea requires no medication or special drinks as treatment. If diarrhoea is intense or continuous despite treatment efforts, consult a doctor via Radio Medical. The condition can cause dehydration which may require administration of intravenous fluids and hospitalization. Diarrhoea may also be caused by a tropical disease, in which case the situation may be dangerous. (See Chapter 26 Vomiting, fever and diarrhoea > Diarrhoea > Treatment.)

2 Assessment

If a patient suffers from abdominal pain, assess the following:

- Pain: when, how and from what area it started: suddenly or gradually; the intensity and type of pain: continuous or intermittent
- Vomiting: present or not, quality of vomit, bowel movements
- Behaviour: is the patient calm and behaving normally or in pain, restless, lying still or twisting and trying to find a comfortable position
- General condition: does the patient appear healthy or sick, is the skin colour normal, flushed, grey or pale, is the forehead warm and dry or cold and clammy
- Breathing: are the rate and depth normal and calm, or agitated; is the patient gasping for air
- Pulse and blood pressure: measure and record
- Temperature: measure from the armpit (not rectum)
- Urine: test for sugar, protein, blood and leukocytes with a test-stick.

● **Always consult a doctor via Radio Medical, if abdominal pain**

- **lasts for more than 4–6 hours**
- **is accompanied by recurrent or intense vomiting or fever.**

3 Pain medication

Abdominal problems are often accompanied by gripping pain which can be treated with diclofenac (3/B). One suppository of 100 mg or 2–4 ml (25 mg/ml) as an intramuscular injection can be given two times a day (not for patients allergic to acetylsalicylic acid!). Morphine should be given only if the pain is excruciating. Pain medication is usually administered once or twice if the pain is severe. If the

pain persists, consult a doctor via Radio Medical.

A continuous burning sensation in the upper abdomen may result from hyperacidity and requires medication that binds the excess acid. Heartburn and gastric catarrh can be treated with medication which binds the acid (2/A), taken half an hour after each meal. A more effective treatment is to give one 20 mg tablet of omeprazole (2/B) every morning.

4 Fluid balance

Significant dehydration can develop in 24 hours, or even 4–6 hours. Basic infusion solution (8/E) can be infused if the patient has abdominal symptoms and is in danger of becoming dehydrated due to intense vomiting or diarrhoea. Intravenous fluid replacement therapy (infusion therapy) is important and even crucial while the patient is waiting for possible evacuation from the ship.

Consult a doctor via Radio Medical about the amount and rate of infusion. Often, a one-litre bag of solution infused in two hours (drop rate about 150 drops per minute, 20 drops = 1 ml) may significantly improve the patient's condition. The following bags can be infused more slowly, so that the total amount of fluid given on one day is 2–4 litres, depending on the patient's condition and response to treatment. (The infusion rate should be 30 drops per minute if the patient is given 2 litres of intravenous fluids in 24 hours.) The patient's condition is continuously monitored, and blood pressure and pulse measured and recorded on a patient chart. The patient should urinate into a bottle, and the amount of urine and the time of urinating are recorded. To ensure that the patient gets optimal care aboard ship, consult Radio Medical frequently.

In severe conditions, such as inflammation of the pancreas or peritoneum, and internal bleeding, more fluids may be

required than mentioned above. A healthy adult can cope with 1–2 extra litres of fluid. However, infusing extra fluids may be life-threatening if the patient suffers from congestive heart failure or heart attack.

5 Most common reasons for acute abdominal pain

Appendicitis

Inflammation of the appendix begins with a vague aching sensation around the navel. During the following hours the pain moves to the right side of the lower abdomen (Figure 22). Trembling, coughing and moving aggravate the pain. Lack of appetite and vomiting are common. The patient is often constipated as well. In appendicitis, the stools may be loose at first, but intense diarrhoea is nevertheless an indication of some other illness (usually a viral infection). The patient may have a slight rise in temperature (37.5–38.0°C), but high fever is not typical. If the patient has a high fever, the cause is most probably not appendicitis. It is typical for the patient to walk leaning forward to avoid sudden movements, or to lie still with the knees bent. When palpating the abdomen, the



Figure 22. The site of the pain and its shifting in appendicitis

right side is often tender and the stomach muscles are tense. The pain typically radiates to the right side of the lower abdomen when the left side is gently pressed.

If the symptoms are vague or mild, and the patient has no fever or loss of appetite, his general condition should be monitored. Even if the pain is mild but persists, a doctor should be consulted via Radio Medical. If the patient has appendicitis, he should be operated on within 24–48 hours. If the patient is going to undergo surgery within the next 12 hours, do not serve him food or much to drink. Antibiotic medication can be started if the patient's condition worsens or if hospitalization is delayed. Ciprofloxacin (7/C) can be administered, two 250 mg tablets three times a day if the patient is not vomiting. A more efficient medicine, suitable also for a vomiting patient, is cefuroxime (7/D), which is administered in 750 mg intramuscular injections three times a day.

If the patient is not operated on time, and the possible antibiotic does not have the desired effect, the appendix may rupture. Fortunately, the rupture is usually followed by a local abscess which restricts the inflammation. However, sometimes the rupture may lead to a life-threatening inflammation of the peritoneum.

Inflammation of the ovaries

Inflammation of the ovaries and appendicitis cause very similar symptoms. It is dangerous to make a wrong diagnosis and, therefore, the condition should be treated as appendicitis.

Inflammation of the pancreas

Pancreatitis is often related either to the use of alcohol (younger people, usually men) or gall stones (older people, usually women). The first inflammation often follows heavy drinking. Recurrence of pancreatitis is highly probable if even a small amount of alcohol is consumed. But recurrence is possible even without alcohol. The

first inflammation is the most dangerous and 10% of all patients with pancreatitis require intensive hospital care. There is no efficient medication for pancreatitis, and it cannot be cured by surgery.

The main symptom is a severe belt-like pain and soreness in the middle of the upper abdomen (Figure 23). Vomiting is a common symptom. If the inflammation is severe, the patient may have a swollen, tender abdomen and general malaise. As the condition proceeds, shock develops (low blood pressure, rapid pulse, cold and clammy skin) and urine secretion ceases. The patient may become disorientated due to the inflammation and not because of alcohol. In this case, sufficient intravenous fluid therapy (4 litres or more in 24 hours) is the correct treatment rather than sedative medication (as in alcohol withdrawal delirium). If pancreatitis is suspected, the patient should be hospitalized.

Attack of gall stones

A bilious attack is caused by gall stones (precipitations of bile) which block the bile ducts. Often the patient is aware of having gall stones and knows the reason for his/her symptoms (Figure 24). The most common symptom is a severe pain on the right side under the rib cage. The pain

often radiates to the back and may cause difficulty in breathing. Vomiting may occur. Unsuitable food may induce pain, but often there is no clear connection with a meal. During a severe bilious attack, the patient may become restless, trying to find the most comfortable position. The pain often eases by itself in 2–3 hours.

When palpating under the rib cage, the patient experiences pain. The body temperature is usually normal. Usually, a painkiller given as a suppository helps to ease the pain. The condition often improves rapidly, and no immediate further care is needed. Surgery may be required later on.

Inflammation of the gall bladder

Inflammation of the gall bladder (cholecystitis) is related to gall stones and is often the first sign. In cholecystitis, the pain persists and the patient develops fever. When palpating the upper abdomen, the pain is more severe than in a bilious attack. When pressing under the right side of the rib cage, the pain grows even worse. Cholecystitis is typical in older women, but usually more severe in men.

If cholecystitis is suspected, and the patient's eyeballs and skin turn yellow (first seen in the eyeballs), he/she is most

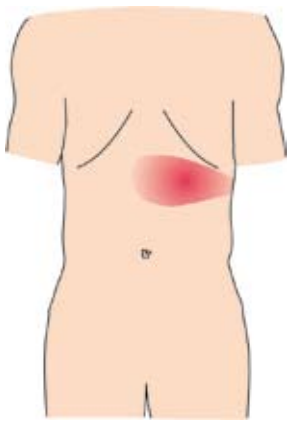


Figure 23. The site of the pain in pancreatitis

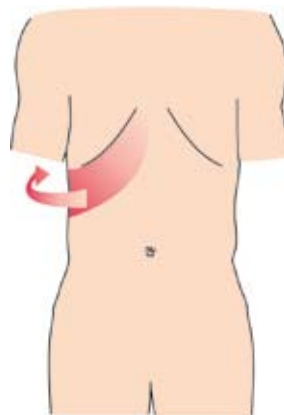


Figure 24. The site of the pain and its radiation to the back in a bilious attack

probably suffering from gall stones and pancreatitis. This condition is rare, but rapidly life-threatening.

Intestinal obstruction

Intestinal obstruction is usually caused by adhesions due to previous abdominal surgery, but it can also be caused by an incarcerated hernia, or even a poorly digested piece of food high in fibre, e.g. a piece of orange.

At first, the patient suffers from intermittent, undulating abdominal pain, increasing vomiting and constipation (even intestinal gases cannot be expelled). Continuous pain may be symptomatic of intestinal necrosis and perforation. Other serious symptoms include fever and palpation tenderness of the abdomen which is visibly swollen. The patient's general condition gradually deteriorates and he/she becomes dehydrated and looks ill. The patient has a dry, coated tongue, increased heart rate, low blood pressure and decreased urinary secretion.

Dehydration cannot be compensated by drinking, because the intestines cannot process fluids. Therefore, intravenous fluid replacement therapy should be started while waiting for a transfer to hospital. Intestinal obstruction may ease off by itself in two to three days without surgery. However, hospital care and monitoring are always necessary.

Hernia incarceration

In hernia incarceration, the hernia becomes swollen and the tissue cannot be pushed back into its place. Hernia incarceration is typical in inguinal (groin), femoral (under the groin) and umbilical hernias. The hernia becomes sore. If there is intestine inside the hernia (as is often the case), intestinal obstruction and perforation may result. In older persons, and especially in women, hernia incarceration may cause only abdominal ache and vomiting, without any symptoms around the hernia itself.

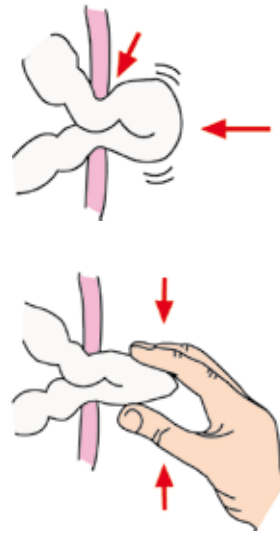


Figure 25. An incarcerated hernia and pushing it inside

An incarcerated hernia should be pushed back into the abdominal cavity while the patient is lying on his/her back. Put your hand around the hernia and squeeze and push back at the same time. The manoeuvre should be done firmly but carefully (Figure 25). If this fails, the patient should be operated on as soon as possible.

Gastric ulcer

The patient may be aware of having a gastric ulcer, but the condition may also appear suddenly without warning (the same applies to a bleeding gastric ulcer). The patient develops sudden and severe pain in the upper abdomen as an ulceration forms in the stomach or duodenum, allowing the strongly irritating gastric acid and other stomach contents to leak into the abdominal cavity. The pain may ease momentarily, but the condition becomes worse again in a few hours as peritonitis develops. At the same time, the patient becomes dehydrated, looks ill and lies still, perhaps with knees bent. Breathing is superficial and rapid, the tongue is dry and coated, the pulse is rapid, blood pressure

begins to drop, and urine secretion diminishes. The patient needs immediate surgery to close the abdominal ulceration. Intravenous fluid replacement therapy is started while waiting for transfer to hospital.

Inflammation of the large intestine

Inflammation of the large intestine, colitis, is caused by inflammation or perforation of the small mucous membrane bulges of the distal part of the intestine. The condition may ease by itself or with antibiotic medication, but may also develop into severe peritonitis or even blood poisoning. The symptoms are usually pain and soreness of the left side of the lower abdomen. Antibiotics and intravenous fluid replacement therapy are initiated while waiting for transfer to hospital.

Ulcerative colitis

Ulcerative colitis is quite rare, occurring particularly in young persons. Bloody diarrhoea is the typical symptom. Ulcerative colitis is well managed with drugs, but sometimes severe diarrhoea or bleeding may develop. Perforation of the large intestine is also a risk.

Other causes of abdominal pain

Vascular diseases can provoke sudden abdominal pain, rupture of the main artery, the aorta, and occlusion of the gastrointestinal blood circulation. These conditions are rare in people under 60 years of age, and often impossible to treat on shore, let alone aboard ship. Abdominal pain is a typical symptom in many diseases, including genitourinary and gynaecological problems.

29 Obstetrics and gynaecological disorders

Although the causes of abdominal pain are often the same in women and men, anatomical differences may lead to female abdominal pains caused by pelvic inflammatory disease, ovarian tumours and ectopic pregnancy. On board ship, women's abdominal pains are treated according to the principles presented in Chapter 28 Abdominal pain.

A female patient should always be asked if there is a chance she might be pregnant. The time of her last menstruation should be ascertained. It is worth remembering, however, that bleeding which resembles menstrual flow may be quite normal during early pregnancy.

If the possibility of pregnancy can be reliably excluded, then at least some

abdominal problems may be ruled out. However, if there is a possibility of pregnancy, the patient should be asked whether the abdominal pain has been accompanied with bleeding. Extra bleeding may signal a potential miscarriage or an ectopic pregnancy. If there has been extra bleeding during pregnancy, or if the bleeding is connected to abdominal pain, consulting a doctor via Radio Medical is recommended. The patient's medical history should be reviewed, and if she is pregnant and complains of upper abdominal pain, her blood pressure should be taken to exclude the possibility of pre-eclampsia.

When administering medicines, it should be remembered that some medications are not suitable for pregnant women

because of the adverse effects they have on the fetus (see Chapter 42 The drugs in the ship's pharmacy and their use).

1 Menstrual bleeding

The usual cause of vaginal bleeding is menstruation (the monthly period). Most women have menstrual cycles of 28 days. However, a woman can be healthy and normal and have only 3 or 4 cycles a year. Despite such variation, this could nevertheless be also a sign of serious underlying problems. Ovulation occurs about 14–16 days before a woman's period (not 14 days after the start of her period). During the second half of the cycle the ovum, if not fertilized, leaves the uterus with the uterine mucous membrane, constituting menstruation.

Menopause, the end of the menstrual flow, occurs between the ages of 40 and 60 years and takes place over a period of 6 months to three years. At menopause, the menstrual cycle usually goes through many changes. A common experience is loss of large amounts of blood during menstruation, and the passage of large clots. Hot flashes or flushes, changes in sleep pattern, headache or migraine, etc., are common signs accompanying menopause.

2 Vaginal bleeding

Any vaginal bleeding that is not normal menstrual bleeding is abnormal, and may be a sign of a problem in the vagina, uterus (womb) or ovaries. Inserting a tampon into the vagina can confirm that the source of bleeding is the vagina/cervix/uterus, not the rectum or urinary bladder.

Vaginal bleeding can have a number of causes, such as hormone imbalance (most common), injury to the vagina or vulva, sexual abuse, infection, sexually transmitted diseases, polyps and fibroids in the uterus, gynaecological cancer, and

complications of an early (possibly unknown) or ectopic pregnancy or threatened miscarriage. Irregular vaginal bleeding may include spotting of small amounts of blood between periods – often seen on toilet tissue after wiping – or heavy periods during which a pad is soaked with blood in one hour. Any vaginal bleeding lasting for weeks at one time is also considered irregular.

Vaginal bleeding with fever, abdominal pain, or unusual mucus or any vaginal discharge may indicate an infection.

Bed rest is recommended if the bleeding is heavy. It is useful for the doctor to know the dates of the patient's normal menstrual cycles and the times of abnormal bleeding, as well as how many napkins or tampons are needed per day. Consulting Radio Medical may be necessary. A woman with vaginal bleeding should visit a gynaecologist when she returns to shore.

3 Vaginal discharge

All women have some vaginal discharge. Healthy vaginal discharge is clear or white and does not smell unpleasant. It may change at puberty, pregnancy and menopause, and there is a cyclical pattern to its thickness. There should be no blood in the discharge between periods, and no bleeding in connection with intercourse.

Infections in the vagina and external genital organs are very common. Infections are most often caused by yeast pathogens. The symptoms of a yeast infection include itching of the external genital organs, clotted vaginal discharge, swelling and burning of the vaginal mucous membranes, and even small ulcers. The patient often complains of pain when urinating. The infection is treated by placing a vagitorium of miconazole (15/A) deep into the vagina for 3–5 nights.

4 Herpes

The symptoms of genital herpes are often severe. Painful blisters and ulcers form on the outer genital organs and the vagina, and the outer genital organs are often severely swollen. In addition to pain, the patient may have a fever, and her inguinal lymph nodes are swollen. The patient can be made to feel more comfortable by giving pain medication and, for example, by washing the painful area with a hand shower.

5 Infections in the uterus and fallopian tubes

The most common single cause of pelvic inflammatory disease is chlamydia bacteria, but the cause may also be gonorrhoea. The symptoms include bilateral lower abdominal pain and bloody vaginal discharge. If the infection spreads to the fallopian tubes and to the ovaries, the symptoms may also include increased purulent vaginal discharge and fever.

Clearly unilateral lower abdominal pain may signal an ovarian tumour, an ovarian cyst (a closed sac filled with fluid), or an ectopic pregnancy. Lower abdominal pain on the right side may be caused by appendicitis. Consulting a doctor via Radio Medical is recommended.

An infection in the lower abdomen can be treated with ciprofloxacin (7/C). The patient should take two 250 mg tablets three times a day for seven days. A more effective medicine, also suitable for a vomiting patient, is cefuroxime (7/D). The patient should be given a 750 mg intramuscular injection three times a day.

If the pelvic inflammatory disease is accompanied by fever, consult a doctor via Radio Medical, and prepare to transport the patient ashore for further treatment.

6 Ovarian tumours and cysts

An ovarian tumour often causes a feeling of pressure or tenderness in the lower abdomen, especially during exercise. An ovarian cyst, i.e. a closed sac filled with fluid, often disappears by itself without any severe symptoms. Sometimes a cyst may rupture, however, and cause severe, often unilateral lower abdominal pain. The pain is not accompanied by extra bleeding.

The patient should recover in a few days with no special treatment, but she can be made more comfortable with pain medication. If the pain grows worse despite rest, hospitalization and surgery may be needed.

7 Ectopic pregnancy (extrauterine pregnancy)

In a normal pregnancy, the fertilized ovum attaches itself to the endometrium inside the uterus. In an ectopic pregnancy the fertilized ovum attaches itself outside the uterus, most often to a fallopian tube. An ectopic pregnancy often causes symptoms that are similar to those caused by a normal pregnancy, including morning sickness and possible swelling and tenderness of the breasts.

The pregnancy cannot proceed in a fallopian tube without complications. An ectopic pregnancy usually ends in early spontaneous abortion, but sometimes the fertilized ovum grows until the fallopian tube ruptures. The rupture often leads to heavy internal bleeding, which can be life-threatening if left untreated.

The symptoms of an ectopic pregnancy include extra bleeding and lower abdominal pain caused by internal bleeding. The lower abdominal pain is sudden and severe, and often radiates to the shoulder area or the diaphragm. The rupturing of a fallopian tube is the most feared complica-

tion of an ectopic pregnancy, and it may also occur without any preceding symptoms. Sometimes the patient is unaware of being pregnant.

The bleeding may be so heavy that the patient goes into shock. As first aid, she should be given fluid intravenously on board ship to save her life, and then hospitalized as soon as possible.

8 Problems during pregnancy

Bleeding

In the last stages of pregnancy, clear, bloody vaginal discharge may signal the rupture of the placenta or the premature detachment of the placenta. Consulting a doctor via Radio Medical is recommended. The patient should be hospitalized for further treatment as soon as possible.

Pre-eclampsia

Pre-eclampsia usually develops during the third trimester of pregnancy. The expectant mother often complains of headache; she may see bright spots, be nauseous and vomiting, and suffer from abdominal pain. If the pre-eclampsia progresses, the patient may have spasms. The patient's blood pressure is high, and tests reveal a leakage of protein into the urine. Medical examination should be started by taking the patient's blood pressure and testing for protein in her urine.

As first aid, the patient should be moved into a quiet, dark room. If she is feeling dizzy and shaky, she may be given one 5 mg tablet of diazepam (4/A). If she has spasms, she should be given diazepam in the form of an injection. The patient should be transported ashore for further treatment as soon as possible.

Miscarriage

Bloody vaginal discharge during pregnancy may signal a miscarriage. If a possible miscarriage is suspected, consult a doctor

via Radio Medical as soon as possible. Immediate hospitalization is usually not necessary if the patient is not bleeding heavily, if the bleeding does not continue too long, and if the bleeding is not accompanied by severe pain.

9 Childbirth

The normal duration of pregnancy is approximately 40 weeks, but a woman may also go into labour suddenly and prematurely. If you suspect that the patient is about to go into labour, arrange her transportation ashore as soon as possible. Consulting a doctor via Radio Medical is also recommended.

Childbirth is preceded by contractions of the womb, during which the womb becomes hard and feels painful. The contractions help to open the orifice of the uterus to allow the baby to be born. At first, the contractions come irregularly, but when the woman goes into labour, painful contractions occur every few minutes, at regular intervals.

If the patient is showing signs of going into labour, consult a doctor via Radio Medical at once. Consider the safest course of action: should the patient be evacuated, or should a doctor or nurse be brought aboard ship, for example, by helicopter? It is wise to maintain radio contact during the entire childbirth for continuous instructions.

Preparing for childbirth

When preparing for childbirth, you need

- clean sheets
- sterile gloves
- bandages
- suction to clean the newborn baby's airways
- sterile scissors and a clamp
- warm water
- towels or soft cloth to wrap the baby in.

If the baby has to be delivered on board ship, three persons should help the expectant mother. One is mainly responsible for the delivery, and one gives assistance. The third person is responsible for the maintenance of the necessary instruments, and is in contact with a doctor via Radio Medical.

The first stage of labour

In the first stage of labour, the orifice of the uterus opens. Normally, this takes 8–10 hours, but can also occur much more rapidly. The contractions grow stronger and come more regularly as labour progresses. The contractions come every five minutes or more frequently, and they last 15–30 seconds. The membranes usually rupture at the end of the first stage of labour, releasing the amniotic fluid.

Once the amniotic fluid has been released, the expectant mother should empty her bladder and stay in bed. She should be made as comfortable as possible, and covered with a blanket to keep her warm. Both sides of the bed should be kept free for the actual childbirth. A doubly folded extra sheet may be placed on the lower end of the bed.

After the amniotic fluid has been released, the contractions often grow stronger and come more regularly. The expectant mother may start to feel a need to push. However, she should not start pushing actively before the baby's head can be seen. The need to push can be eased if the expectant mother turns on her side and concentrates on her breathing. During each contraction, she should breathe shallowly and quickly (shallow panting). When she feels the need to push, she should not push, but should breathe deeply in and out.

The second stage of labour

The expulsive stage of labour usually lasts from 30 minutes to an hour. When the baby's head appears, the expectant mother

may start pushing actively. She should turn on her back and push during every contraction, as if she were defecating.

During every contraction, the expectant mother

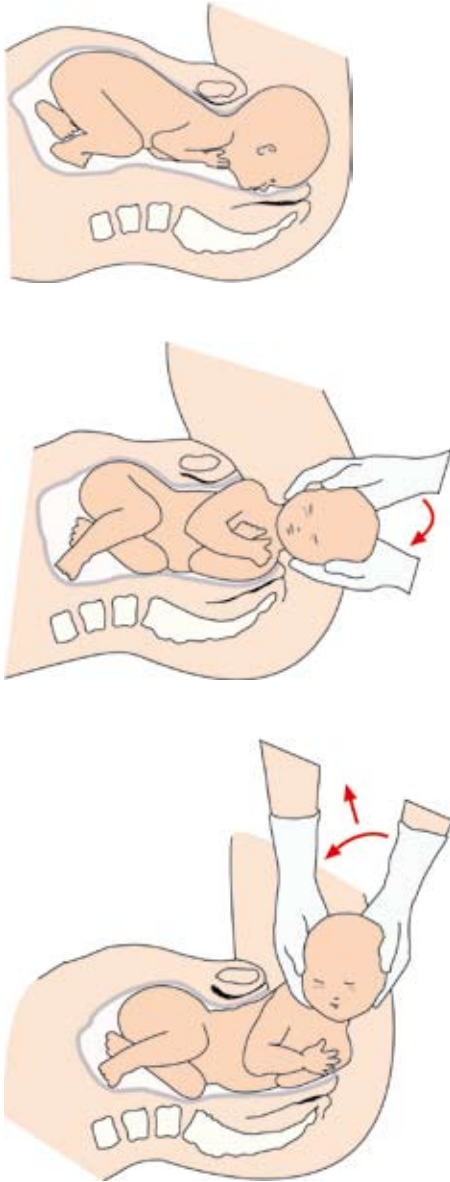
- takes a deep breath
- pushes while holding her breath
- exhales deeply.

This should be repeated until the contraction is over. During the contraction, a small amount of blood, mucus or faeces may emerge. The anal region should be wiped clean with water and a disposable towel, from the vagina towards the anus. The washing water should be changed often. Change your gloves and the sheet as well, if it is stained.

In normal childbirth, an assistant is not always needed. However, when the baby's head emerges, it is useful to have an assistant to support the perineum to keep it from being torn. This is done by slowing down the emerging head with one hand, while at the same time pulling down the perineum along the head with the other hand.

Once the baby's face has turned to either side, you should ask the mother to push, while at the same time gently pulling the baby's head in an outward and downward direction. This helps the emergence of the upper shoulder. The lower shoulder should emerge when you pull slightly upwards (Figures 26–28). If the shoulders do not emerge easily, the mother's thighs and knees should be firmly bent. Sometimes the baby is born by breech delivery, which means that the baby's buttocks or feet are the first to emerge. In such cases, it is important to avoid touching the baby at least until the navel has emerged.

The newborn baby should be carefully dried and kept warm, because an infant's thermoregulation is not fully developed, and the lowering of body temperature can be dangerous. If the infant has trouble



Figures 26–28. Childbirth and giving assistance

breathing or sounds wheezy, clean the mouth and nose of amniotic fluid, blood and mucus. If the infant is unresponsive or limp, you can try skin stimulation, i.e. gentle patting, to make him/her more lively.

The umbilical cord should always be handled with clean gloves and instruments, because it is directly connected to the infant's circulatory system. The umbilical cord should be tied, for example, with a piece of gauze or cotton thread. Tightly tie one thread around the umbilical cord at about two centimetres from the infant's navel, and another thread at about four centimetres. When this has been done, the umbilical cord may be cut between the two threads.

After the baby has been born, the mother can push out the placenta. The placenta usually detaches within half an hour after the baby has been born. Once the uterine cavity is empty, it contracts strongly, and the uterine veins collapse. If the placenta does not detach or the bleeding is heavy after the birth, try to control the bleeding by enhancing the contraction of the uterus. A suitable medication for this is methylergometrine maleate (15/B): 1–2 tablets three times a day. The contraction of the uterus can also be helped by placing the infant to the mother's breast and gently pressing the uterus at the region of the mother's abdominal wall. Do not pull the placenta by the umbilical cord even if it does not detach, because this may result in the turning over of the womb and heavy, uncontrollable bleeding.

If the placenta does not detach within an hour of the birth, or if the mother is bleeding heavily, arrange her transportation to a hospital as soon as possible. To control the bleeding, plug the vagina with, for example, a pad of gauze.

After the birth, the mother should be monitored for possible bleeding. Check the blood in the sanitary napkins, and weigh them to estimate the amount of blood. A clean sanitary napkin should be weighed

in a plastic bag before use. A used napkin should be put in a plastic bag and weighed again. The total amount of blood loss is the difference in the respective weights. In normal childbirth, the total bleeding

amounts to about 300 ml. If the amount of blood exceeds 1000 ml, the mother should be given fluid intravenously to replace the blood she has lost. After the delivery, the mother should also take a shower.

30 Symptoms of the lower abdomen and acute diseases of the urinary organs

Symptoms of the lower abdomen may result from diseases of the urinary organs or the genitals. Intestinal disorders and, for example, hernia, may also cause the symptoms. See also Chapter 28 Abdominal pain and Chapter 29 Obstetrics and gynaecological disorders.

The need to urinate even when only a small amount of urine is passed suggests bladder or urinary tract irritation in both men and women. In women, the reason is often cystitis and, in men, prostatitis (infection of the prostate) or prostatic hyperplasia (enlargement of the prostate). If the infection of the urinary organs gets worse, the patient may have fever and pain in the lower abdomen, along with the need to urinate more often. Cramp-like pain may be a sign of a urolith (urinary stone) in which case the pain can be very severe.

A urine sample – to test for protein, sugar, blood and leukocytes with a test strip – should always be taken from a patient with symptoms of the lower abdomen. Blood in the urine can be a sign of kidney stones, protein a sign of nephritis (infection of the kidneys), and leukocytes (white blood cells) a sign of urinary tract infection. Blood in the urine of women may be due to menstrual flow. A woman

should therefore always be asked if she is menstruating. Sugar is secreted into the urine only in the case of inadequately treated diabetes.

The presence of leukocytes (white blood cells) in urine is a sign of bacterial infection, and the patient should be treated with an antibiotic. Ciprofloxacin (7/C) one 250 mg tablet once a day, or one cefadroxil (7/E) 500 mg tablet twice a day should be given for 5–10 days. The patient should rest if he/she has a fever or is feeling weak.

To ease cramp-like pain, diclofenac (3/B) can be given: one 50 mg tablet three times a day, or one to two 100 mg suppositories a day (not suitable for patients who are hypersensitive to acetylsalicylic acid). Paracetamol (3/A), one to two 500 mg tablets three times a day, should be given to patients hypersensitive to salicylate.

A serious illness, for example a tumour, is rarely the cause of symptoms in the urinary organs. Infections of the urinary organs can also turn into symptomless, latent, progressing illnesses. Therefore, even after the symptoms have disappeared, the patient should always be re-examined by a doctor, to make sure that he/she has recovered fully.

1 Blood in the urine

Blood is usually not secreted into urine. Only very rarely is there so much blood that the urine appears reddish. Minor haematuria (a small amount of blood in the urine) can be detected only with special urine test strips. Minor haematuria can occur in connection with a urolith (urine stone) or a urinary tract infection. Tumours of the bladder or urinary tract, and tuberculosis (rare) can also cause haematuria (blood in the urine). If there are no other symptoms, the haematuria is usually not immediately life-threatening, and there is no need for immediate treatment. However, a thorough urologic examination on shore is necessary to clarify the reason for the haematuria.

The urinary tract may suffer damage in an accident. Also a fall or a kick on the back can cause contusion of the kidneys. An accident can also cause a more severe renal rupture which needs immediate surgery. A hit on the crotch may cause injury to the urethra. In severe injuries it can rupture completely, causing bleeding in the urinary tract. If the urine flow is normal, there is no need for immediate attention. Inability to urinate is a symptom of a severe urinary tract injury, and the patient needs medical attention on shore. Do not attempt to catheterize, as it can cause more damage.

2 Urolith

A urolith (urinary stone) is composed of urinary compounds formed in the renal pelvis. It travels along the ureter and causes pain when it gets stuck. The pain starts quite suddenly. At first it is wave-like and then usually becomes unbearable. The pain is located mostly in the loins on one side. The pain often radiates to the back and to the lower abdomen or groin region. The patient is sweaty and restless due to

the severe pain and he/she may twist and turn, trying to find a position where the pain would lessen.

When the patient is examined, palpation tenderness is detected on the back at the site of the kidneys. There is usually little blood in the urine, which can be detected with test strips. The urine rarely looks bloody.

The pain should be treated with sufficient pain medication. Drinking a lot of liquids is neither necessary nor recommended when the patient is in pain. When the pain has stopped, drinking can speed urine flow and thus help to remove the urolith from the body. The urine should be strained through a sieve to confirm the diagnosis. The urolith is usually small, rough and dark like a grain of gravel. There is no hurry to get the patient on shore if the pain stops, but he/she should be examined by a doctor some time later.

3 Urinary tract infection

A urinary tract infection is usually caused by bacteria in the urine. A burning or smarting sensation in the lower abdomen, together with the need to urinate more often than usually, are common symptoms of bladder infection. If the patient also has fever and back ache, the entire urinary system, including the kidneys, is infected. Urinary tract infection is more common in women than in men. In older men, prostatic hyperplasia (enlargement of the prostate) and problems in the urine flow can cause urinary tract infection.

A urinary tract infection can be detected with test strips. During an infection there is often a little blood in the urine. The basic treatment is drinking a lot of water to increase urine flow and irrigation of the urinary tract. In addition, antibiotic medication is needed. The possibility of a sexually transmitted disease (STD) might also be considered.

4 Prostatitis

A symptom of prostatitis (inflammation of the prostate) is a mild, but unpleasant ache in the lower abdomen, and perhaps in the back as well. The pain can radiate to the inner thigh and to the testicle. The patient usually has no fever. The condition is mild and harmless and does not call for immediate attention.

The patient should dress warmly, because cold can aggravate the symptoms. Ordinary pain killers are sufficient treatment. The need for further examination is decided by a doctor on shore.

5 Urinary retention

Urinary retention means that the bladder can not be emptied. Urinary retention occurs mostly in older men who have prostatic hyperplasia (enlargement of the prostate). Urinary retention can develop suddenly and unexpectedly, and usually after heavy alcohol use. The bladder may stretch and can no longer be emptied even when there is a strong need to urinate. Urinary retention is not immediately dangerous, but should be treated as soon as possible or at least within hours.

The appropriate treatment for urinary retention is catheterization. This needs to be done in sterile conditions, and without force, in order not to cause damage to the urethra (see Chapter 48, catheterization of urinary bladder). The catheterization technique should be reviewed before carrying out the procedure. When the bladder is empty, the catheter is removed. The catheterized urine is tested with test strips to rule out infection.

6 Orchitis and epididymitis

Orchitis (inflammation of the testicles) is almost always a complication caused by mumps, whereas epididymitis (inflammation of the epididymis) can be caused by other bacteria or, for example, by tuberculosis or sexually transmitted diseases. It is difficult to differentiate between these two conditions.

The symptoms are mild or severe pain, and tenderness of the testicle which is often slightly swollen. The treatment is to give pain killers and to order bed rest, if necessary. Scrotal support is provided by underwear and a bandage. A cold pack can temporarily ease the pain. If the patient does not have mumps and a testicle becomes very painful, the cause is probably torsion of the testis. This is common in boys and in young men. The patient needs an operation on shore as soon as possible, because the testicle will go into necrosis within a few hours.

7 Paraphimosis

A tight foreskin (prepuce) can sometimes get stuck behind the head of the penis (glans penis). The glans penis then swells and the foreskin tightens until it can no longer be retracted over the glans penis. The condition may look serious, but there is hardly ever danger of a severe circulation problem. The condition can often be treated by applying a cold pack around the glans penis. When the swelling has abated, the edge of the foreskin can be firmly taken between the thumb and forefinger and retracted back over the glans penis.

31 Sexually transmitted diseases (STD)

As many diseases spread in sexual contact, it is better not to talk about venereal diseases (syphilis, gonorrhoea, etc.), but rather about sexually transmitted diseases. The definition is not entirely unambiguous, because most of these diseases can spread in other ways as well. On the other hand, some infectious diseases, for example, hepatitis B, can spread also in sexual contact (see Chapter 38 Infectious and contagious diseases). Thus, the symptoms of sexually transmitted diseases may vary greatly.

1 Symptoms

Depending on the disease, the symptoms of sexually transmitted diseases develop within a few days or weeks from the time of the contagion. In men, the first symptoms may include urethral discharge, especially in the morning before urinating, the need to urinate often, and swelling of the urethral orifice. In women, the symptoms are often less abundant, and may include vaginal discharge, the need to urinate often, and a burning sensation when urinating. The inguinal glands may become swollen. Later, when the infection spreads to a larger area, the symptoms are a combination of infections in various organs (salpingo-oophoritis, orchitis). The disease is often diagnosed by the later symptoms, and it is therefore possible for an asymptomatic person to have an infectious disease for a long time, and to be infectious without knowing it (e.g. HIV).

A sexually transmitted disease damages the mucous membranes of the genitalia and thus makes the patient more vulner-

able to new infections. If a person has a STD, he/she is much more easily infected with another one. Thus, it is likely that a person is not infected with only one STD. A person can also become infected or infect someone else with several diseases during one single act of intercourse.

- **If a person is infected with one sexually transmitted disease, it is possible that he/she is infected with several sexually transmitted diseases at the same time.**

2 Treatment

Even if left untreated, sexually transmitted diseases do not quickly cause serious damage and inability to work. Thus, they should not normally be treated at all on board ship. It is worth remembering that one type of medication treats only one type of disease, so the other STDs that the patient may have may be left untreated. The treatment may also give the patient a false sense of security, and a feeling that all sexually transmitted diseases have been taken care of. The patient should undergo a medical examination immediately after docking. The purpose of the examination is to ascertain what kinds of STDs the patient may be infected with, and to make certain that all the diseases are properly treated at the same time.

If you suspect that the patient may be infected with a STD, inform the patient at once. The patient should refrain from sexual intercourse until his/her condition has been reliably diagnosed and treated.

- **If a person suspects that he/she is infected with a STD, or if symptoms of a STD have developed after sexual intercourse, his/her condition must be diagnosed and treated prior to further sexual intercourse, in order to prevent spreading the possible infection to others.**

Only in critical situations should a patient with a STD be treated on board ship. Such situations include the ship being at sea for a long time, or the patient having severe symptoms. If you suspect that the patient has gonorrhoea, the proper medication is ciprofloxacin (7/C). The patient should take three 250 mg tablets in a single dose. If you suspect that the patient has chlamydia, he/she should be treated with doxycycline, one 150 mg tablet once a day for 10 days. If the treatment is started on board ship, it should be borne in mind that confirming the diagnosis afterwards is often impossible. One must also remember that there are some bacterial strains which are resistant to the above-mentioned treatment. This is also a strong reason for refraining from treatment on board ship until the bacteria and suitable treatment for it have been determined.

Anyone who is suspected of having a STD should undergo a medical examination and seek treatment immediately after docking, regardless of whether they have been treated on board ship or not. Even if a person has been treated on board ship and no symptoms have developed after the treatment, he/she should refrain from sexual intercourse until all other possible infections have been treated or ruled out on shore.

3 Sexual behaviour and the risks of different types of sexual contact

The risk of being infected with a STD in heterosexual contact is just as great as in homosexual contact. Some sexually transmitted diseases can be asymptomatic for a long time. But being asymptomatic does not mean being non-infectious. Some infections can spread even years after the time when the patient was infected with the disease, if not treated properly.

- **A person infected with a STD can remain infectious for years, even for the rest of his/her life. Unprotected sex, even with a familiar partner, involves a serious risk of infection.**

Safe sex is

- sex in a mutually monogamous relationship, if neither partner has had previous non-treated infections
- kissing on the skin and lips
- hugging, petting and caressing
- masturbating together.

Sex with a possible risk of infection includes

- deep kisses
- touching the genitalia with the mouth
- intercourse even with a condom, if the condom breaks or slips off
- urine or faeces getting in contact with the skin
- many sex partners, or a partner who is a prostitute or a drug addict.

Sex with a serious risk of infection includes

- anal sex or intercourse without a condom
- ejaculation or urine into the mouth
- blood contact

- caressing the anal region with the mouth
- sharing contaminated sex toys with partners.

4 Protection against sexually transmitted diseases: The condom

The risk of getting a STD is considerably diminished by using a condom during every act of intercourse. The same applies to oral sex. The condom should be used throughout the entire sexual act to prevent any contact with the mucous membranes. A condom can be used only once. Old condoms may break more easily than new ones.

- **When correctly used, the condom gives protection against STDs.**

When putting on the condom, always check how it is rolled down. Pull the foreskin back, and peel the condom over the erect penis. Make sure that there is no air in the place reserved for the semen. Also, be careful not to break the condom with sharp nails or rings.

Immediately after the ejaculation the penis should be withdrawn from the vagina, still having the condom on it.

5 Sexually transmitted diseases

Gonorrhoea

Gonorrhoea is a bacterial infection of the mucous membranes. It is asymptomatic in almost 50% of all cases. The first symptoms develop a few days after being infected, and may include itching and pain at the urethral orifice, followed by thick, yellow, purulent discharge, and the need to urinate often (Figure 29). If left untreated, gonorrhoea may result in prostatitis and

orchitis in men. In women, it may lead to infections in the fallopian tubes, and even peritonitis.

Chlamydia

Chlamydia is a urinary tract infection caused by bacteria. The first symptoms develop from one to three weeks after being infected. One out of five men (20%) and three out of four women (75%) do not notice any symptoms at all.

In men, the symptoms include a clear, watery discharge from the urethra, and a burning sensation when urinating. In women, the symptoms may include vaginal discharge. If left untreated, chlamydia may cause uterine infections or infertility in women, and epididymitis in men. Chlamydia may also cause arthritis which resembles rheumatoid arthritis.

Syphilis

Syphilis is a bacterial disease, which may also remain asymptomatic. A few weeks after being infected, a red chancre, which gradually becomes an ulcer, forms on the skin or the mucous membrane (Figure 30). The ulcer feels hard, "like a button pressed into the skin", and its base is smooth and moist. The patient's inguinal lymph nodes are swollen but painless.

The ulcer may be found in the genital area, but also on the tongue, inside the throat, on the lip, on the finger, or almost anywhere on the body. The ulcer usually heals by itself, leaving a scar. Once the ulcer has formed, antibodies to syphilis can be found (the Wasserman test).

Once the ulcer has healed, the disease still progresses, if not treated. About 1.5–2 months after the primary infection, the symptoms include swollen but painless lymph nodes, various skin problems, and possibly even iritis and renal damage. Eventually, the symptoms usually disappear by themselves, and the disease becomes asymptomatic. It nevertheless continues to

advance in the body. Two years after the infection, the disease is no longer contagious. It may, however, be transferred from the mother to the fetus, causing developmental anomalies and malformations. At this stage of the disease, the presence of syphilis in the body can only be diagnosed with tests for antibodies.

About 10–15 years after the infection, the syphilis has spread throughout the body. The patient has extreme difficulty walking because of muscular hypotonia of the lower extremities. Syphilis causes megalomania and dementia, and may lead to sudden death from aneurysm and rupturing of the aorta.

Condyloma

Condyloma is a growth on the mucous membranes, caused by the human papilloma virus. In men it is found on the penis (Figure 31); in women it is found on the labia or in the region of the anus. Condyloma is a fleshy, soft growth, sometimes with a cauliflower-like appearance. The infection spreads during intercourse. Checking and, if necessary, treating the partner is necessary. There is a connection between condyloma and cervical cancer.

HIV/AIDS

This is an incurable disease caused by the human immunodeficiency virus (HIV). The disease causes the collapse of the immune system, exposing the patient to various infections, which ultimately lead to death.

The symptoms develop within one to eight weeks from the infection. They resemble the symptoms of a common viral infection and include fever, headache and nausea. The patient's glands are swollen. These first symptoms disappear in a few weeks, after which the disease may be asymptomatic for 10 years or more. After the asymptomatic stage, the symptoms include swollen glands, fever, and diarrhoea. The actual AIDS (auto-immune deficiency

syndrome) develops in years, possibly decades, after the primary infection. The active AIDS phase varies from a few months to several years. The most common causes of death are various infectious diseases and tumours.

The HIV infection spreads via blood throughout the body if the virus gets into the circulatory system. Casual sexual contacts involve a particularly high risk of infection. The risk of exposure is further increased if semen, blood, urine or a large amount of saliva comes into contact with the mucous membranes of the mouth, the anus, the vagina, or skin wounds.

It is possible to be infected with HIV without having had sex with an infected person. In central Africa, the infection may spread, for example, via contaminated medical instruments. People who use intravenous drugs are at risk of getting the virus from used injection needles. There is always a possibility of infection from used needles, so nurses should be careful not to get pricked when handling them.

It is worth remembering that you cannot get AIDS from

- objects (with the exception of contaminated sex toys)
- air
- toilets
- bath water
- clothes
- shaking hands, touching, talking, etc.

By the time when the first symptoms appear, HIV antibodies are not yet detected, but they are detected before the symptoms disappear. If the blood tests are not positive (antibodies are not present) 3–6 months after the exposure, it is obvious that the person is not infected.

The HI virus spreads mostly through blood and excretions. The disease does not spread in the course of normal work life or communication. Testing for HIV antibodies

does not protect from the infection. The risk of being infected depends on personal behaviour.

A person who suspects that he/she might be infected with HIV should have a test done on his/her own initiative. These tests are performed free of charge at local health care centres, STD clinics, and AIDS support centres. It is possible to take the test anonymously.



Figure 29. Purulent discharge from the urethral orifice in gonorrhoea



Figure 30. A crater-like painless lesion caused by syphilis



Figure 31. Condyloma on the penis

32 Dry and itchy skin

1 Dry skin

Causes

Today's problem is washing oneself too often. The skin is soaped and washed in the morning before going to work and again in the evening, and in shift work, after every shift. As a result, almost everyone's skin dries, especially in the wintertime.

Prevention

Prevention is the most important treatment for dry skin. Soap is replaced by a milder, preferably unscented product which has been developed for dry skin. Less soap is

used, and it should be used only on areas where it is really needed. The more often that soap is used, the milder it should be.

Skin reacts to the temperature of water. Hot water dissolves sebum from the skin's surface and softens the keratin layer even when soap is not used. Cooler water is less irritating and drying for the skin.

If changing washing habits is not enough to maintain the skin's moisture, cream-type lotion (unscented basic lotion) should be applied to the skin after every washing, when the skin is still moist. The lotion is easier to apply thinly when the skin is moist, and will not stain clothing.

Air-permeable, light lotion used often is better than a heavy, greasy ointment used rarely.

2 Itchy skin

Itchy skin is merely a symptom, not an actual skin disease. If the skin colour is normal, the reason for the itching is usually dryness of the skin. Scratching may cause drying and lichenification (thickening and roughening of the skin), which makes the skin itch even more, leading to a vicious circle. Sometimes, the reason for the itching may be a hereditary tendency to dry-

ness and itching (so called atopic skin), scabies, allergic reaction or, rarely, some internal illness (e.g., cirrhosis of the liver or renal disease).

If the treatment for dry skin mentioned above is not sufficient, special moisturizing ointments, such as basic ointments containing carbamid, can be used. Itching can also be controlled with internal antihistamine medication, for example, by giving cetirizine hydrochloride (5/B), one 10 mg tablet once a day. If external factors such as rough clothing, sweating, or certain foods cause the itching, they should be avoided.

33 Rash

1 Examination

The patient is asked about the onset of the rash and about its possible external causes: What was the patient doing when the rash appeared, and did his/her skin come into contact with any substances? Avoiding the irritants may help to prevent further rashes.

Symmetrical symptoms on the right and left side may indicate that the rash is triggered from the inside, for example, by a food allergy. A unilateral rash is often caused by an external skin irritant.

Risk of infection

If a rash is watery, or if vesicles or pustules are present, it should be treated as infectious. In the prevention of a infectious rash, cleanliness is important, especially in public facilities like washrooms. Soap and towels are not to be shared. A rash that has spread all over the body may be caused by an infection. The patient should not be in contact with other members of

the crew until a risk of infection has been ruled out. A doctor should be consulted via Radio Medical.

Assessing the rash

Rashes are grouped into superficial and deep rashes according to their appearance. In a **superficial rash**, the outer layers of the skin are irritated. The outer layer may be thick, lichenous or even cracked, but the deeper skin layers are healthy. In the case of a superficial rash, treatments applied on the skin are effective.

In a **deep rash**, the infection has spread to the deeper skin layers and the skin has thickened completely. In this case, oral medication is needed in addition to local treatment. The rash takes at least a month to heal completely, and the treatment should always be continued to completion even if the skin appears less red and almost normal after only a few days of treatment.

A rash and the patient's general symptoms

If the skin disease is related to general symptoms, such as fever or nausea, also internal medication is needed. Before starting the medication, a doctor should be consulted via Radio Medical.

If a sudden rash has spread over a wide area of the body and is accompanied by the first symptoms of shock, breathing difficulties, blurred speech, stiffness of the tongue, or swollen lips, the patient should immediately be given 1 ml of adrenaline (1 mg/ml, 8/A) intramuscularly (see Chapter 4 Shock). A doctor should be consulted via Radio Medical. After the consultation, instructions are followed and, if necessary, antibiotic or cortisone treatment is started. Antibiotics are taken orally and continued until the patient is better or can be transferred for treatment on shore.

2 Treatment

The basic treatment for rashes is shown in Table 5. If in doubt, always consult a doctor via Radio Medical.

3 Different types of rash

Eczema is the most common type of rash that occurs on board ship. The other types of rash described here are important because many jobs on board ship may cause them. Some of the rashes discussed here are caused by bacteria or viruses and can be infectious.

Eczema

Eczema is a non-contagious superficial inflammation of the skin. The name eczema does not tell the cause of the disease, but rather it describes the clinical picture of the condition. Eczema can be caused by internal or external factors, and is characterized by redness, swelling, burning, oozing, blistering, scaling and lichenification of the skin, depending on the stage of the

disease (Figure 32). The main symptom is itching.

Contact eczema is caused by an external factor that irritates the skin and brings about the clinical picture of eczema. Too strong or too frequent exposure to this external factor damages the skin. The most common external factors causing eczema are detergents, solvents like acetone and turpentine, plastics, adhesives, mineral oils, lubricants and cutting fluids. The engine room crew's **irritation eczema** may be caused by some of the handled substances, or by substances used for cleaning the hands (Figure 33). In this case, a substance that is too strong damages the skin immediately. On the other hand, it may take weeks or even months for a milder substance to cause eczema.

A rash can also be due to an **allergy**. Allergies are chronic and affect the entire skin, not only the places where the rash first appeared. With repeated exposure to the allergen, in time less and less of it is needed to cause symptoms. Common allergens are rubber and rubber chemicals, dual component resins and adhesives. If metal on the skin causes an allergic rash, this is usually caused by the nickel in the metal (Figure 34).

The basic treatment for eczema is a local treatment according to the symptoms (see Table 5). All irritating and exacerbating factors should be avoided. Protection should be used if the irritant can not be avoided. Sometimes it is necessary to change jobs, sometimes even occupations.

Impetigo

Impetigo is a superficial, very contagious skin infection caused by bacteria. It is characterized by red eczema which has a light yellow crust and is occasionally wet. The fluid is filled with bacteria.

Treatment consists of cleaning the crust from the skin with water, for example,

III Symptoms and diseases and their treatment

Table 5. Basic treatment of rashes

Skin rash	Local treatment	Systemic treatment	Exemplary disease	Comments
Superficial rash, red, burning (Figures 32, 33, 34)	Hydrocortisone cream 1% (9/F)	Cetirizine hydrochloride (5/B), one 10 mg tablet once a day	Eczema	Consider the cause
	+ watery, purulent			
	+ general symptoms (fever, malaise, etc.)	Polyvidone iodine solution 10% (9/A) Neomycin-bacitracin ointment (9/D) Methylrosanilinium 0.5% solution (9/G)	Cefadroxil (7/E) one 500 mg tablet twice a day or Ciprofloxacin (7/C) 250 mg 1 tbl x 2/day	
Deep rash, red, burning (Figures 35, 36)	Heat pack, Neomycin-bacitracin ointment (9/D)	Cefadroxil (7/E) one 500 mg tablet twice a day or Ciprofloxacin (7/C) 250 mg 2 tbl x 2/day	Abscess	Rest, contagious
Purulent ulcer	Cleaning the wound with warm water, Polyvidone iodine solution 10% (9/A) Neomycin-bacitracin ointment (9/D)	Cefadroxil (7/E) one 500 mg tablet twice a day or Ciprofloxacin (7/C) 250 mg 1 tbl x 2/day	Erysipelas, open abscess	Rest, contagious!
Blotchy rash with itching at night, wrists, armpits, penis	Permethrin cream 5% (9/H) Hydrocortisone cream 1% (9/F)	Cetirizine hydrochloride (5/B), one 10 mg tablet once a day	Scabies	Clean clothes, treat all family members
Pubic lice	Malathion shampoo 0.5%			
Sunburn	Hydrocortisone cream 1% (9/F)			Avoid the sun, use sun protective cream
Spread rash, symmetrical (Figure 37) (allergy, virus, inflammation, infection)	Isolation	Radio Medical consultation		
Broken skin between toes, crotch rash (Figures 38, 39)	Miconazole cream (9/C) Methylrosanilinium 0.5% solution (9/G)			
Itch	Prevent skin from drying For treatment, see eczema	Cetirizine hydrochloride (5/B), one 10 mg tablet once a day		

by showering and cleaning the area with a skin-cleansing cream. After this, antibiotic cream is spread on the skin twice a day. Because the disease is very contagious, good hygiene is crucial. The person must not share towels, soap or clothes.

Folliculitis

Folliculitis (inflammation of the hair follicle) is a bacterial skin disease which affects hairy areas. Sweating and, for example, engine room grease and oil on the skin block the follicles and cause infection. The symptoms are superficial, 1–2 mm wide, white papulopustules (small pimples filled with pus), through which a hair often grows. The skin feels quite symptomless.

Thorough cleaning with a brush and soap is often sufficient treatment. If necessary, antibiotic cream may be used. A skin disease that is caused by bacteria may spread if general cleanliness is neglected.

Abscesses

Abscesses are caused by staphylococcal bacteria. Typically, abscesses are located in the neck and in the armpits (Figure 35). An abscess can develop in a few days or a week, from a small acne-like pimple into a red, burning ball deep in the skin. The patient may also have fever, feel generally ill, and have enlarged lymph nodes.

Treatment with an antibiotic is always necessary. Cefadroxil (7/E), one 500 mg tablet is given twice a day for 10–14 days. Development of the abscess can be advanced with a heat pack. Do not lance or squeeze abscesses, because this may cause the pus to spread to the surrounding tissues via blood circulation. An abscess is filled with bacteria and, thus, can infect others when it bursts. Good hygiene and protection from infection are important. Local treatment of a burst abscess is daily cleaning with a shower.

Erysipelas

Erysipelas is a deep skin infection caused by bacteria, located typically in a lower limb. The bacteria get into the body through a cut or an abrasion.

Usually, the disease starts with sudden high fever, after which, within a few hours the inflamed area of the skin starts to swell and ‘burn’ strongly (Figure 36). The red area is usually sharply outlined, and there may even be blistering or abscesses. The inflammation destroys lymph vessels and the lymph circulation in the limb is permanently weakened. This causes permanent swelling in the infected area, making it susceptible to new episodes of erysipelas infection.

The treatment is antibiotic medication. Cefadroxil (7/E), one 500 mg tablet is given twice a day for 10–20 days. Broken skin, through which the bacteria entered the body, for example, foot ulcers or broken skin between the toes, should be treated as well. The skin must be kept in good condition after it has healed to prevent the infection from recurring. Reducing the swelling usually requires wearing a surgical stocking.

Athlete’s foot

Athlete’s foot is usually caused by a fungus which grows between the toes (Figure 38). A rash can also be present on the arch of the foot and on the sides of the foot. The skin between the toes becomes lighter in colour, sweaty and itchy. There may be blisters, scaling and thickening of the skin on the arch of the foot.

Local antimycotic medication is usually sufficient to treat fungus between the toes (see Table 5). The treatment should last at least 4–6 weeks, to prevent recurrence of the disease.

To avoid athlete’s foot, it is important to keep the toes dry; moisture-absorbing cotton or woollen socks should be worn. The feet are washed with acidic (pH about 3) washing fluid. After washing, the feet are rinsed carefully and dried well.

Figure 32. Dry, superficial eczema (atopic eczema)



Figure 33. Chronic hand eczema



Figure 34. Allergic contact eczema (caused by sensitization to nickel)





Figure 35. Abscess in the neck



Figure 36. Erysipelas in the lower limb



Figure 37. Generalized widespread eczema



Figure 38. Fungal infection 'athlete's foot' between the toes



Figure 39. Fungal infection in the flexure of the groin

Rash in the inguinal flexure and under the breasts

Fungus can cause red, itchy eczema on sweating, moist areas of the skin, for example, on the bends of the arms and legs, and under the breasts (Figure 39). The treatment consists of keeping these skin areas dry, and dusting with miconazole powder. Using soap should be avoided, as should mechanical irritation of the skin, for example, using a rough towel. Powder is sprinkled on the rash one to two times a day for two to three weeks.

Scabies

Scabies spreads from one person to another by skin contact. It is caused by a mite (*Sarcoptes scabiei*). The most typical symptom is itching at night-time. Tunnels made by the mite can be seen in areas where the skin is thin, mainly in the armpits, wrists, and between the fingers, never on the neck or on the face. In men, a typical place is the penis, which shows red, slightly raised skin alterations.

The treatment starts with a thorough wash and change of clothes. The patient's skin is treated with permethrin cream (9/H), which is spread all over the skin, without

missing a spot, but not on the hair or face. The cream is left to act for 8–15 hours. During the treatment the patient's hands are not washed, but are covered with cotton gloves during the entire time. If, for some reason, the hands must be washed, the cream is reapplied immediately after the wash. After the treatment the skin is washed and the clothes are changed again.

During the scabies treatment:

- all family members are treated at the same time
- instructions are followed carefully
- the bed linen is aired outside for two hours
- the clothes are washed
- any remaining itching is treated according to the symptoms.

After scabies has been treated, the itching can typically continue for several days, depending on the condition of the skin. The itching can be alleviated by antihistamine tablets and, for example, by hydrocortisone cream. Do not repeat the scabies treatment until two weeks have passed from the previous one.

Mole – Skin neoplasm, nevus

Moles (nevi) are the most common neoplasm (tumour) of the skin. They are brown in colour and round or oval in shape, and are darkened by sunlight. About one nevus in a million can turn into a malignant tumour, melanoma. 50% of melanomas appear at the site of a nevus.

It should be suspected that a nevus is turning malignant if its colour becomes uneven or black, its edges irregular, if it starts to itch, or if it gets red around the edges. A mole like this should be removed soon.

34 Protective gloves and protective skin ointments

1 Protective gloves

Work procedures and substances that are handled at work should not harm the skin, so that special skin protection would not be needed. However, if this is not possible, protective gloves are to be used.

Protective gloves differ, both in how comfortable they are, and how well they protect. To be able to select the right gloves you need to know what substance will be handled. In addition, note that:

- The hands become sweaty in all rubber and plastic gloves. Sweat causes the skin to soften and may trigger a rash.
- Rubber gloves may cause hypersensitivity, so plastic gloves are better in this sense.

It is important that the gloves are resistant to chemicals. The manufacturer knows whether the gloves offer protection against the handled substance, and how long it takes before the substance permeates the gloves. If this information is not available, it is possible to test the suitability of the glove for the handling of a certain substance. Fill the glove with the substance and see how

long it takes to permeate the glove. The best skin protection is given by a seamless glove without a lining, under which a cotton underglove is used.

Protective gloves are personal. After a workday they must be washed and rinsed also from the inside and hung up to dry. A worker should have several pairs of gloves, so that they can be changed during the workday.

2 Protective ointments

A protective ointment is not a substitute for a protective glove. A protective ointment is effective only for a short time. Vaseline-type protective ointment offers protection against water for a while, but it prevents the skin from breathing and can cause sweating and a rise in the skin's internal moisture level. Protective ointments increase and speed up the absorption of the handled solvents into the skin. In fact, the effect of using a protective ointment can be more harmful than if no ointment were used. Protective gloves are always a better solution. Protective ointments are practical only because they make it easier to clean the hands after working.

35 Joint and muscle pain

1 Joint pain

Sudden pain in a joint is usually connected with an injury. There is reason to suspect arthritis, if the pain has not been caused by an accident or unusually heavy strain.

Symptoms and causes

Typical symptoms of arthritis:

- redness
- warmth
- swelling
- pain
- functional disability.

Arthritis may be caused by rheumatism (rheumatoid arthritis), in which case it is usually located symmetrically in both limbs. Sometimes it may occur as reactive arthritis, which may follow a genital or intestinal inflammation (i.e., chlamydial infection or salmonella) after two or three weeks. In this case the arthritis is usually in only one limb.

The cause of chronic joint pain is usually osteoarthritis. This is a normal phenomenon connected with ageing. Osteoarthritis in the large, weight-bearing joints is the most problematic, and often leads to incapacity to work.

On board, the most common cause of arthritis is probably gout, which usually appears at the base of one of the big toes. Gout is caused by uric acid, which crystallizes in the synovial fluid into sharp crystals causing a severe inflammation of the joint. An aching and burning sensation appears suddenly, and the joint area is swollen, red and warm. The pain attack may strike after a convivial social evening. Some foods and also alcohol raise the uric acid level in the blood.

Treatment

Acute arthritis may be treated by soothing the joint with rest and pain medication. For pain relief one 50 mg tablet of diclofenac (3/B) two to three times a day can be given. Patients who are allergic to salicylate may be treated with paracetamol (3/A), one or two 500 mg tablets three times a day.

Applying an ice pack to the inflamed joint is often the best first aid. When the inflammation has calmed down, heat application may replace the cold. Consulting a doctor via Radio Medical is necessary if the condition is severe and does not improve with the treatment of the symptoms. On shore, a doctor can determine the cause, and continue treatment according to the diagnosis.

2 Neck and shoulder pain

Tender spots in the muscles of the shoulder area are typical of muscle-based neck pain. The pain does not usually radiate to the upper limbs, but sometimes numbness may occur in the hands. Muscular pain may spread to the upper neck and the back of the head, to the upper arm, and even to the musculature of the forearm. Turning the head is often difficult.

Muscle relaxation is the most important treatment. Regular physical exercise prevents the symptoms. Pain medication may be taken if needed, in same amounts as in joint pain.

Degenerative changes in the cervical disk often limit the range of motion. A slipped disk in the cervical region, a condition similar to sciatica, may occur even in young people. The symptoms include pain which radiates to the upper limbs,

numbness in the forearm and fingers, and occasionally, muscle weakness and loss of feeling. Consulting a doctor via Radio Medical is necessary, especially if the symptoms are severe and of rapid onset.

3 Back pain

Sudden back pain

Acute lumbago is a suddenly appearing pain in the lower back, which often limits back movements considerably. The pain does not radiate to the lower limbs.

In sciatica, the pain radiates from the lower back to the lower limbs. The condition may be severe and require immediate treatment, if the symptoms include faecal or urinary incontinence, urinary retention and/or numbness around the anus and buttocks, or weakness and paralysis in one or both of the lower limbs.

- **Consult a doctor via Radio Medical, if**
 - **the backache is severe and is not relieved in a resting position**
 - **the sensation of the skin around the anus weakens**
 - **bladder and intestinal functions change.**

Sciatica is usually caused by a ruptured disk in the low back or pelvic region, when a part of the vertebral disk bulges into the spinal cord canal. Pressure or irritation in the nerve root causes the pain to radiate to the lower limbs. This mechanism is not present in lumbago, and explains why the

pain caused by lumbago is relieved much faster than sciatic pain.

Lumbago or sciatica?

The treatment of lumbago is not total bed rest. It is, however, best to avoid straining the back for two or three days, and after that to gradually return to normal strain as soon as possible. A suitable pain medication is, for example, one 50 mg tablet of diclofenac (3/B) two to three times a day for three or four days. Those allergic to salicylate, may be treated with one or two 500 mg tablets of paracetamol (3/A) three times a day. If the muscle tension is severe, it can be relieved with a 5 mg tablet of diazepam (4/A) two or three times a day. Warning: causes drowsiness! Therefore anyone being treated with diazepam should not be carrying out tasks which require alertness and accuracy. A good physical and muscular condition help prevent the symptoms from recurring.

Sciatica takes longer to heal than lumbago, but complete bedrest is not necessary. Lifting heavy burdens and sitting for long periods should be avoided for some weeks. Pain medication is given symptomatically when necessary.

Chronic back pain

Prolonged, chronic lumbago may be caused by conflict between the physical condition of the back and the requirements of work. Restricted movements, degeneration, alterations in posture, and muscle weakness may occur in the spine. Tension in the muscles of the pelvic region or in the lower limbs may make the back susceptible to chronic pain. The spine

LUMBAGO	SCIATICA
<ul style="list-style-type: none"> • localized back pain • rapid onset • stiff back 	<ul style="list-style-type: none"> • pain radiating to lower limbs • numbness or loss of sensation in lower limbs • possible weakness in the lower limbs

also degenerates with age. Good physical condition (and thus blood circulation), as well as muscle balance of the body, and particularly of the lower limbs, help prevent chronic back pain.

4 Shoulder pain

The shoulder joint is susceptible to pain because of its structure. The joint has a wide range of motion, and it depends almost entirely on soft tissues for support.

In the first stages, shoulder pain is treated symptomatically with pain medication when needed. If the pain persists, a course of treatment may be prescribed. For example, one 50 mg tablet of diclofenac (3/B) 2–3 times a day for 10 days. Those allergic to salicylate may be given one or two 500 mg tablets of paracetamol (3/A) three times a day. Shoulder tendinitis usually responds well to anti-inflammatory drugs. Chronic shoulder pain often requires surgery, such as tendon repair or pressure-relieving operations.

5 Tendinitis

There is a risk of developing tendinitis, especially if a job requires repetitive strain on the same joint and working in cold, damp conditions. The wrists and ankles are most susceptible to tendinitis. When the joint is moved, a grating noise may accompany the movement. This is caused by oedema in the carpal tunnel and an inflammatory reaction.

The treatment for tendinitis is usually rest and pain medication. A splint or a bandage prevents the joint from bending into extreme positions, warms the tendon area and soothes the condition. The bandage must not be too tight. Pain medication may be used to relieve the inflammation, for example, a course of treatment with diclofenac (3/B), one 50 mg tablet 2–3 times a day for 10 days. Those allergic to salicylate may be administered one or two 500 mg tablets of paracetamol (3/A) three times a day. If the condition persists, a visit to a doctor is necessary.

36 Mental disorders

1 Symptoms

The most common, minor symptoms of a mental disorder are, for example, anxiety, social phobias, obsessive-compulsive symptoms, and depression. If the symptoms include loss of functional capacity and loss of sense of reality, hallucinations, and the patient's unawareness of his/her illness, the condition is more severe and is called a psychosis. This requires immediate treatment on shore. The possibility of violent behaviour and an increased risk of suicide must be taken into account when the transfer to shore is arranged.

Sometimes the symptoms may develop gradually and increase slowly within weeks or months. In this case, immediate treatment on board is not justified, and the patient should be advised to seek treatment on shore.

In assessing the severity of the mental disorder, it is important to find out whether the patient is aware of his/her illness.

- **Always consult a doctor via Radio Medical about mental disorders!**

2 Treatment

Diazepam (4/A) relieves the tendency to spasms, calms the patient and makes him/her drowsy. It may be given when the patient is extremely anxious or restless. The normal dosage in severe anxiety is 10 mg three times a day. At most, 20 mg may be given at hourly intervals until the patient falls asleep.

When the patient suffers from hallucinations or other forms of severe mental disorder, he/she may be given 20 mg of diazepam to calm him/her. This dosage is given every 2 hours until the patient falls asleep. An anxious or restless patient may be a threat to him/herself or others, and needs to be monitored at all times. The patient should be transferred to shore for continued treatment as soon as possible.

3 Sending a patient with mental problems or suspected mental problems for treatment

A person who behaves or speaks strangely may be schizophrenic. He/she should be sent ashore for treatment before the condition deteriorates and becomes hallucinatory. A hallucinating patient is a great risk to himself and to the whole ship.

According to the international rules and regulations, the officer in charge is responsible for sending the patient for treatment. The officer in charge should inform the doctor about the symptoms in advance, because the patient's own story may differ considerably from reality. As the ability to work is an important issue, the officer in charge should ask the doctor to refer the patient for psychological tests to determine his/her ability to continue in his/her occupation.

4 Mental illnesses

Panic disorder

Panic disorder is common in young women. It is often connected with a dramatic life change. A panic attack usually develops in minutes, and is often connected with an overwhelming fear of losing control, or the fear of death.

The anxiety and hyperventilation connected with a panic attack cause a variety of physical symptoms that add to the anxiety. Typical symptoms are, for example, palpitations, tremor, a choking sensation, dizziness and chest pains, as well as numbness and tingling of the hands and lips. The panic attack usually passes in 10 to 20 minutes, and the patient's condition gradually returns to normal.

For some patients, breathing into a paper bag helps relieve the hyperventilation. If the panic attacks recur frequently, a 5 mg tablet of diazepam (4/A) three times a day may be prescribed for the rest of the voyage. It is important to remember that diazepam affects the memory and weakens the ability to perform tasks requiring accuracy.

The symptoms of many illnesses, such as asthma, myocardial infarction and pulmonary embolism are similar to those of the panic attack, and this makes it difficult to determine the true cause of the symptoms. However, a sudden asthma attack is accompanied by a clearly audible wheezing breath sound, whereas a panic attack is not. A patient suffering from an infarction is usually middle-aged or older, pale, cold and sweaty. In a panic attack, the pain is localized to the chest muscles. Pulmonary embolism often causes the skin to turn bluish pale in colour, and the condition is not relieved in the course of 10 or 20 minutes.

Post-traumatic stress disorder and debriefing

A severe psychological trauma may easily lead to post-traumatic stress disorder. The symptoms can be divided into three categories:

- reliving the traumatic event in one's nightmares and hallucinations
- avoiding anything resembling the traumatic event (e.g., fear of the dark after a shipwreck) and emotional numbness – inability to feel, or a feeling of complete detachment
- symptoms of increased alertness, e.g. trembling and palpitations. These symptoms may lead to work incapacity for months, and may sometimes become chronic.

After a traumatic event on board, such as a suicide or a fatal accident, a psychological debriefing should be arranged within 72 hours of the accident as a precaution against post-traumatic stress disorder. In some shipping companies this procedure is already common practice. In addition, discussing the traumatic event with a friend or a colleague is often just as beneficial as psychological debriefing. It should be remembered, however, that drinking alcohol while discussing the traumatic event cancels the beneficial effects of the discussion.

When an accident happens on board, it is important to inform the crew of the possibility of post-traumatic stress disorder, so that every one recognizes the symptoms in time and can seek help accordingly. Depression and substance abuse are often connected with untreated and persisting post-traumatic stress disorder.

Personality disorder

Impulsiveness, a quick temper, black-and-white thinking, and mood unpredictability are some of the symptoms connected with personality disorder. Other possible symptoms include momentary paranoid thinking

related to stress, tendency to substance abuse and chronic self-destruction, presenting as drug overdoses and repeated slashing of the wrists. Typical of the illness is also a craving for adventure, and a sense of not belonging anywhere. That is why, in the past, people with a personality disorder often went out to sea. When an employee's behaviour seems to be pointing to a personality disorder interfering with his work performance, psychotherapy may be discreetly suggested. This could help improve the possibly tense human relations among the crew on board. Transferring the employee to work on shore is also advisable.

Depression

The symptoms of depression include a decrease in energy level and the inability to feel pleasure. Loss of appetite or overeating are also typical of the illness, as well as a lack of initiative, or difficulties in remembering and concentration. Early morning awakening, psychomotoric slowness, and lack of sexual drive, are often connected with severe depression.

It is crucial to recognize depression in time because it may lead to suicide. A depressed patient must always be asked whether he/she has ever thought of committing suicide. It is also important to find out whether the patient has ever attempted suicide, or whether there is a history of suicide in the patient's family or among his/her friends. In both cases, his/her suicide risk is higher than normal.

The patient should also be asked whether he/she has considered any particular ways of committing suicide. If the patient has a plan, he/she must be closely monitored at all times, and must never be left alone. The possible means for committing suicide by hanging, such as belts, shoelaces and ties, and anything needed for making a fire, must be taken away from the patient.

The patient must be informed of the possibility of treating depression efficiently with both medication and psychotherapy, and that usually the symptoms ease in weeks. A depressed patient with suicidal thoughts must nevertheless be monitored around the clock until he/she is admitted to hospital on shore.

There is special cause for concern if a severely depressed patient becomes calm and serene. This could mean that the decision to commit suicide has been made, in which case the patient needs to be monitored even more closely.

Mania

Mania is the reverse state of depression. The patient seems abnormally elated and energetic, his mood fluctuating between cheerful and irritable. A decreased need for sleep, racing thoughts, poor reasoning ability, and hyperactivity, are typical in mania. A manic patient may seriously endanger the safety of the ship and of the crew.

Psychotic mania with delusions of grandeur is often relatively easy to recognize, and a patient unaware of his/her condition must be transferred for psychiatric treatment by compulsion.

The restlessness and anxiety connected with both mania and depression can be relieved, for example, with 10 mg of diazepam given three times a day.

Acute psychosis

Severe anxiety and sleeplessness lasting for a few days are often the first signs of acute psychosis, followed by psychotic symptoms. Auditory hallucinations occur commonly. The patient often hears strange voices which are threatening and accusing or offensive. The patient may often hallucinate about other people conspiring against him/her or spying on him/her. Sometimes, motoric symptoms are connected with acute psychosis, i.e., either strong agitation or complete immobility. The hallucinations

may be a sign of schizophrenia worsening within the following weeks or months, or they may be connected with alcohol withdrawal symptoms, which appear within hours after stopping alcohol consumption. The hallucinations should not be disputed with the hallucinating patient, but supporting them is not advisable either.

An anxious or restless psychotic patient may be dangerous to him/herself or others, so he/she needs monitoring at all times. The patient may be given 20 mg (= 4 tablets) of diazepam (5 mg/tablet, 4/A). The dosage is repeated every two hours until the patient falls asleep.

Mental problems connected with substance abuse

An alcoholic who stops drinking or cuts down his/her daily alcohol consumption considerably, may develop symptoms of delirium tremens within hours. At first, the patient has a severe hangover, and trembles and sweats. Usually, towards the night he/she loses his/her ability to concentrate and becomes restless and anxious. When the condition deteriorates further, the patient becomes disoriented as regards time, place and other people, and starts to have hallucinations.

The most common hallucinations are visual and tactile hallucinations, which often involve large numbers of animals, for instance, rats and bats. A typical patient with delirium tremens keeps beating the air, trying to expel something invisible to others. The patient's life may be threatened, as he/she may even jump overboard in order to escape from his/her "persecutors".

A patient with delirium tremens may be given 20 mg (= 4 tablets) of diazepam (5 mg/tablet, 4/A). The dosage is repeated every two hours until the patient falls asleep.

If delirium tremens is suspected, it is advisable to carefully examine the patient's head to exclude head injuries. Alcoholics are prone to accidents, and a fall may

cause brain damage, such as haemorrhage, which in turn can cause disorientation. Many drugs can also trigger short-term hallucinations, which may be mistaken for psychoses. Amphetamine psychosis

is a common drug-induced psychosis with symptoms such as hallucinations of persecution, as well as auditory and visual hallucinations. The contracted pupils of a heroin abuser often reveal drug abuse.

37 Alcohol and drugs

Alcohol – specifically ethanol – is the most common addictive substance. Other common drugs are cannabis (marijuana, hashish, and hashish oil), amphetamines, opiates (heroin, morphine, opium), LSD and cocaine.

The use of these drugs may affect the capacity to work, as well as alertness and activity, which is why it is important to recognize a drug abuser in the workplace. A drug addict may suffer from a variety of symptoms, either due to the effects of the drug, or drug withdrawal symptoms. It is important to take into account the possibility of drugs in assessing the cause of any symptom. The first aid in drug-induced problems depends on the situation. Consulting a doctor via Radio Medical is often necessary. A summary of drugs and their properties is shown in Table 6.

1 Alcohol

Alcohol suppresses the part of the brain that controls judgement, resulting in a loss of inhibitions. It also affects physical co-ordination causing blurred vision, slurred speech and loss of balance. Alcohol is implicated in a large proportion of fatal traffic accidents, assaults and violent incidents.

Alcohol dulls the brain. Although alcohol initially makes people feel relaxed, long-term excessive use can ultimately increase anxiety and cause depression. It is also related to problems with sleeping, mood swings, violence and suicide (about

two-thirds of suicide attempts are considered to involve alcohol).

Women who drink heavily during pregnancy are at risk of having babies with a condition called fetal alcohol syndrome. This syndrome can result in growth deficiency, nervous system problems, lowered intelligence, and facial abnormalities in the child.

Drinking too much too often causes physical damage, increases the risk of contracting some diseases, and worsens other diseases. Excessive drinking over time is associated with

- stomach disorders, such as gastritis and bleeding from stomach ulcers
- high blood pressure (which can lead to a stroke)
- arrhythmias
- liver cirrhosis
- cancer of the mouth, throat and gullet
- brain damage
- sleep disturbances
- depression
- inflammation of the pancreas
- alcohol epilepsy
- sexual problems, impotence
- obesity.

Alcohol intoxication

Drinking a very large amount of alcohol at one time (binge drinking) can lead to unconsciousness, coma, and even death. In general, an alcohol concentration of over 3.5 pro mille content in the blood

is considered a poisoning. However, habituation to alcohol greatly influences the type and severity of the symptoms. Injuries related to drunkenness may decrease the level of consciousness further. In such a case it is difficult to distinguish the symptoms caused by alcohol intoxication from those caused by the injury. Vomiting when unconscious can lead to death by suffocation.

Mixing alcohol with other drugs is extremely dangerous. This includes prescribed and 'over-the-counter' (OTC) drugs such as sleeping pills, cough medicines or antihistamines, as well as illicit drugs such as cannabis, ecstasy, cocaine or heroin.

After giving first aid, always consult a doctor via Radio Medical for instructions on further treatment.

Alcohol withdrawal syndrome

The alcohol withdrawal syndrome may occur when continuous and heavy drinking of alcohol stops. Milder forms of the syndrome include tremulousness ('shakes'), seizures, and hallucinations, which typically occur within 6–48 hours after the last drink.

A more serious form of the syndrome, called delirium tremens, involves profound confusion, hallucinations, and severe over-activity of the autonomic nervous system, beginning typically 48–96 hours after the last drink.

The patient with delirium tremens may be given four 5 mg diazepam tablets. The dosage is repeated every two hours until the patient falls asleep. Consultation with Radio Medical is recommended.

Alcohol dependence

When consumed frequently or in large quantities, alcohol is addictive. A person is generally considered to be dependent on alcohol when he/she has experienced three or more of the following symptoms during a year:

- a strong urge to drink
- difficulty controlling drinking
- physical withdrawal symptoms, such as sweating, shaking, agitation and nausea when trying to reduce drinking
- a growing tolerance to alcohol (needing larger quantities to get the same effect)
- gradual neglect of other activities
- persistent drinking even though it is obviously causing harm.

Problem drinking occurs when a person is not dependent on alcohol, but drinks enough to cause actual physical or psychological harm.

Cut down drinking

If you think you are drinking too much, keep a 'drinking diary', noting how much alcohol you drink each week. It will reveal if you are drinking within safe guidelines. It will also help you identify the situations that you need to avoid to cut down your drinking.

These tips may help cut down your alcohol consumption:

- do not drink at all on board ship
- go out later, so you start drinking later
- replace your 'usual' drink with one containing less alcohol
- skip the 'quick drink' at lunchtime or after work
- keep at least two alcohol-free days a week
- do something else than go to have a drink
- drink more slowly, or take non-alcoholic drinks between alcoholic ones
- buy beers and wines with a lower alcohol content, and keep a supply of non-alcoholic drinks at home
- set yourself a limit of, for example, three to four units (men) or two to three (women) for any one occasion
- find other ways to relax.

2 Cannabis products (marijuana, hashish, hashish oil)

Cannabis (*Cannabis Sativa*, hemp) is a plant that belongs to the nettle genus. The narcotic effects are derived from the leaves and flowering tops of the plant. The active ingredients are cannabinoids (tetrahydrocannabinol, THC), which are smoked in either marijuana cigarettes, also known as 'joints', or in a pipe, or mixed with tobacco.

The effects vary among individuals; cannabis may cause hilarity or giggling, but also depression. The user's conception of time and place may be blurred, and the ability to estimate speed, especially in traffic, often deteriorates. The mucous membranes in the mouth dry up so that the tongue tends to stick to the palate. Panic attacks are possible. The user can be recognized by dilated pupils and bloodshot eyes. Other typical symptoms are high pulse rate and high blood pressure, as well as low blood sugar. The mucous membrane in the mouth is irritated.

3 Amphetamine and its derivatives (ecstasy, methamphetamine)

Amphetamine is a synthetic drug produced by boiling. The active ingredient is a phenyl derivative, amphetamine, which is injected into a vein, sniffed up the nose like cocaine, or taken orally in a self-made pill. Amphetamine can be in the form of powder, paste or liquid. The smell is unique, and it is said that "once you have smelled it you will never forget it". Amphetamine stimulates the central nervous system, and thus, affects all body functions. In addition to a feeling of euphoria, it raises the pulse rate and blood pressure and dilates the pupils. The user is often sweaty and agitated, self-confident, aggressive and has a ready

wit. The mucous membrane of the mouth is dry. Amphetamine also eliminates the sense of hunger. Sweating is severe, and urinating is often difficult. Long-term use causes hallucinations and sleeplessness. Visible weight loss and needle marks on the arms or, in the more experienced user, elsewhere in the body, are signs of severe addiction.

There are several amphetamine derivatives which share the basic chemical structure of amphetamine (MDMA, MDEA, MDA). Their effects are similar to those of amphetamine. When under the influence of the drug and when the effects start to fade, the addicts are often a danger to themselves and others. An addict can be recognized in the same way as an amphetamine addict.

4 Khat

Khat is used by chewing the fresh leaves and tops of the khat bush. The active ingredient is cathine, cathinone, which affects the central nervous system. The users believe that their thoughts are clear and that they are continuously achieving something, and succeeding in everything they do. This happens when, in fact, they are doing almost nothing. Typical symptoms are high pulse rate and blood pressure, but insomnia, stomach ache and pulmonary problems are also possible. A user may become psychotic.

5 Opiates (opium, morphine, heroin)

The opium extracted from the poppy plant is refined into morphine, and further refining produces heroin. The active ingredients are opiate alkaloids, morphine and codeine. Morphine and heroin are taken intravenously or smoked.

Opiates are paralyzing substances which cause fatigue and loss of appetite.

Table 6. Drugs and their properties

Drug	Appearance	Usage	Immediate effect	Recognizing the addict	Negative effects	Addiction
Cannabis Hashish	brown, black or greenish slabs or crumbs used in chocolate or as oil	smoked in a pipe mixed with tea, sweets or cigarettes	euphoria, talkativeness, cheerfulness withdrawal profoundity fatigue, panic, disorientation, deteriorated sense of speed	bloodshot eyes hashish smell, pipe or other equipment, finding the drug in the possession of the addict	passivity, lack of initiative, apathy mental disorders dangerous in traffic	psycho-logical
Marijuana	green or brown fibres, seeds	smoked as a cigarette both ends of the joint twisted	similar to hashish but milder	as with hashish	similar to hashish only in those with severe addiction	psycho-logical
LSD	different coloured small tablets or clear fluid	used as such mixed in a liquid absorbed in paper	visual and auditory hallucinations sense of being outside one's own body increased confidence, cheerfulness depression, panic	disorientation, shivering, fearfulness increased secretion of saliva uncertain movements overall picture of a mental disorder	mental disorders, suicide chromosome abnormalities some of the reactions recur even after discontinuing LSD use	psycho-logical
Opiates Morphine Heroin	tablets heroin also as liquid or white powder	large doses injected into muscle or vein sometimes sniffed up the nose	euphoria disorientation, fatigue contracted pupils loss of appetite may stop breathing effects of heroin are more severe	intoxicated appearance but no alcohol smell needle marks withdrawal symptoms very small contracted pupils	rapidly developed addiction AIDS and hepatitis transmitted by dirty needles possible death from overdose	physical and psycho-logical

Drug	Appearance	Usage	Immediate effect	Recognizing the addict	Negative effects	Addiction
Cocaine	white powder	sniffed up the nose smoked injected	similar to amphetamine, but more short-term	restlessness dilated pupils sweating, high pulse rate needle marks nosebleed	damaged nasal septum speaking through one's nose addiction AIDS, jaundice mental disorders, death	physical and psychological
Amphetamines	different sized tablets capsules white powder liquid	injected into muscle or vein sniffed up the nose swallowed	agitation, anxiety fears, hallucinations insomnia, loss of appetite	restlessness dilated pupils sweating, high pulse rate needle marks shaking, disorientation	addiction brain haemorrhages effects similar to cocaine	physical and psychological

They relieve both physical pain as well as psychological anxiety. Opiates cause a feeling of euphoria, and a severe addiction develops rapidly, possibly even after the first time of using the drug.

An addict can be recognized by the contracted, very small pupils and needle marks on the arms or elsewhere in the body. If deprived of the drug, the addict becomes sweaty, nauseous, shivery, and may have diarrhoea. The fear of withdrawal symptoms makes the addict dangerous, because he/she is willing to do anything at all in order to get another dose of the drug.

6 Cocaine

The active ingredient in cocaine is cocaine hydrochloride. It can be sniffed up the nose, used intravenously or smoked. Cocaine is a light-coloured substance: crack is lumpy, and 'freebase' is a fine powder. The effects are similar to those of amphetamine, and an addict can be recognized in the same way as the amphetamine addict.

7 Hallucinogens (LSD, psilocybin, PCP)

Hallucinogens cause hallucinations. Their effect depends on the dose and on the addicts' individual differences.

38 Infectious and contagious diseases

Infectious and contagious (communicable) diseases are caused by bacteria, viruses, parasites and fungi. An infected patient may or may not have symptoms. The micro-organisms may enter the body in food or water, be transmitted by insects (insect bites), by touch, or they may enter the body through the airways. Poor hand hygiene further spreads the disease from one person to another. Sexually transmitted diseases spread by touching and body fluids.

1 Symptoms

Contagious diseases may display a variety of symptoms. Typical symptoms are fever, fatigue, headache, nausea and intestinal problems. Widespread skin reactions are also typical.

The symptoms may develop rapidly, even within hours, or may take days to develop. Very rarely can the cause be diagnosed without laboratory or other tests.

2 Examination and treatment

Measures should be taken to find out whether a patient has done something that could have led to the infection. It is important to find out whether the patient has eaten or drunk something possibly contaminated or inadequately prepared, or whether anyone else on board has similar symptoms. It is also important to know when the meal or other event took place.

All symptoms must be recorded. A patient with fever should be asked about sweating, shivering, and the stages of the fever (don't forget malaria!). A follow-up form (at the end of the book) makes it easier to monitor the patient's condition.

- **Always consult a doctor via Radio Medical if you suspect a contagious disease.**

It is often difficult to diagnose a contagious disease on the basis of the symptoms only. The medication available on board ship, or medications in general, are not effective in all contagious diseases. Thus, the treatment on board depends mostly on the symptoms. The aim is to relieve the symptoms and make the patient as comfortable as possible until he/she can be transferred to shore for further tests and follow-up treatment. The prevention of dehydration is crucial.

3 Isolating a patient with a suspected infection

If it is suspected that a patient has been infected with a contagious disease, he/she must be isolated from the rest of the ship crew to prevent the disease from spreading. Further need for isolation may be decided after consulting a doctor via Radio Medical.

It is usually enough that the patient stays in his cabin and only essential visits are allowed. The patient and others on board must take care to wash their hands often enough to prevent the disease from spreading by hands or items touched.

If it is suspected that the disease spreads easily, the isolation should be stricter. Only the person responsible for treating the patient may be allowed in the cabin, and preventive measures must be taken in treating the patient. Protective clothes and gloves must be worn. To prevent droplet infection, anyone treating

the patient must wear a disposable mask (according to the instructions received via Radio Medical).

The patient must not use public toilets, and the toilet used by the patient must be disinfected with chlorinated detergents. The dishes and cutlery used by the patient must be disposable, and disposed of directly after use. The used bed clothes, towels, etc. must be handled with gloves and machine-washed separately in the hottest possible water. Stained surfaces in the cabin must be disinfected with a chlorinated detergent.

4 Avoiding risk of infection when treating a patient

Blood and body fluids are possible sources of infection, and handling them always involves an increased risk of infection, for example, hepatitis, HIV and AIDS. The risk of infection from the patient to the care giver is especially high if the care giver's skin is pricked by a needle or sharp instrument used in the treatment. Anyone treating a patient must bear in mind the possible risk of infection from the patient, and safety precautions must always be taken.

- **Blood and body fluids are always possible sources of infection, so PROTECT YOURSELF!**
- **Sharp instruments used in the treatment of the patient must be handled with care.**

Instruments and clothes contaminated by the patient's secretion or body fluids must always be handled with gloves, and packed away carefully so that they are not a risk to anyone else handling them. Contaminated surfaces must be disinfected. Anyone treating the patient must wear gloves. If the care giver's hands are stained during the treatment, they must be washed immediately

and disinfected thoroughly with a fluid containing 40–60% ethanol.

- **A disposable mask should be worn when mouth-to-mouth respiration is given.**
- **Always wear gloves when you touch the patient!**

Any care giver who suspects having been infected by the patient must report this, e.g. to the shipping company's occupational health service. They will start further investigation of whether an infection could be possible, and take care of the juridical details, such as possible compensation for an occupational accident in connection with the treatment.

All disposable instruments used in treating the patient must be placed in an undamaged, waterproof container and disposed of according to instructions concerning hazardous waste. Other instruments must be carefully washed and disinfected for future use. Contaminated, secretion-stained tables and rooms must be cleaned immediately after the treatment with a chlorinated disinfectant (2% chloramine or 0.25% liquid sodium hypochloride) or a disinfectant containing phenol. Finally, it is advisable to wipe the surfaces with a liquid containing 40% ethanol. Gloves must be worn during the disinfection. It is important to remember that used gloves may be a source of infection.

5 Communicable diseases

Malaria

Malaria is caused by a single-cell parasite transmitted to human beings by mosquito bite. The incubation period is 10 to 15 days, but the symptoms may start several months, even years after returning from a journey. The first symptom is fits of repeated chills (ague), lasting 15 minutes to an hour. These are followed by fever,

which lasts 1 to 4 hours and may rise up to 40–41°C. Sweating after the bout of fever leads to the fever dropping. The symptoms recur regularly. If untreated, malaria may persist for decades as recurring bouts of fever.

- **Even slight fever during, or even long after a journey in a tropical country may be a sign of malaria!**

Other typical symptoms of malaria are diarrhoea, pulmonary problems and problems of the central nervous system, such as disorientation and lowered level of consciousness. Sometimes the clinical picture of malaria is more atypical and resembles influenza.

The resistance of malaria to the effects of different medications constantly varies. This is why different regions have different recommendations for preventive medication. The World Health Organisation (WHO) annually publishes recommendations for preventive health care, which vary depending on the geographic area. Prevention of malaria on board ship should follow these yearly updated instructions.

In addition to preventive medication, it is important to take other preventive measures, which are often even more efficient than the actual medication. The aim of these measures is to avoid mosquito bites, and thus, infection.

The instructions below should always be followed in regions where there is a risk of malarial infection:

- Always wear long-sleeved shirts/blouses and long trousers outdoors between sunset and sunrise, especially in the countryside and on the outskirts of towns.
- Use insect repellent on exposed skin areas.
- Before going to sleep, destroy mosquitoes by spraying insecticide in the sleeping quarters and inside the mosquito net.

- Always use a mosquito net over your bed. Insect repellent spray may also be sprayed on the mosquito net and on clothing to increase the effectiveness of the protection.

Hepatitis A

Hepatitis A is a viral infection which spreads by faeces-contaminated food or water. It is common in central Europe, and even more widespread in countries of poor hygiene. Some foods, such as oysters, grow in contaminated waters and the virus accumulates in them.

The incubation period may vary from two weeks to two months. The clinical picture may resemble stomach flu with fever, nausea, vomiting and muscle aches. The symptoms may also be similar to a sudden inflammation of the liver: yellow skin and especially yellow whites of the eyes, dark, 'coffee-coloured', urine and grey faeces.

There is no medication for a viral infection. That is why the best treatment for hepatitis A is rest and long-term abstinence from alcohol consumption.

The most effective preventive measure is a vaccine which gives 10-year protection against hepatitis A: an injection of gammaglobuline (usually 2 ml) intramuscularly offers protection for about two months; it is not as effective as the vaccine.

Hepatitis B

Hepatitis B is a viral infection transmitted, for example, via blood, body fluids and sexual intercourse. It also spreads through shared needles, and during childbirth from mother to child.

The incubation period is 2–6 months. The illness may be asymptomatic in over half of infected adults. A part of those infected become chronically infected carriers, and have either no symptoms or develop chronic hepatitis.

The symptoms of hepatitis B are similar to those of hepatitis A. Treatment is symptomatic; there is no specific treat-

ment. The illness increases the risk of liver cancer later in life.

The most important preventive measure is to minimize exposure to the disease. Any contact with body fluids and blood must be avoided, as the disease is transmitted through them. There is a vaccine for hepatitis B, which offers 5–10 year's protection after three vaccinations.

Other forms of hepatitis

Hepatitis C is a disease similar to hepatitis B. It is also transmitted in a similar way, e.g. through shared needles. Also other forms of hepatitis, such as D and E exist. There is no vaccine to protect against these diseases!

Yellow fever

Yellow fever is a viral infection. Its origins are in Africa but it has also spread to Central and South America. The virus is transmitted by mosquitoes, first to monkeys, and then to humans. In towns it is transmitted from human to human. The risk is highest in the jungle. In addition to the vaccine against yellow fever, insect repellent is the most effective protection against the disease.

The incubation period is two to five days. The first symptoms are fever and redness of the face. The clinical picture includes liver and kidney dysfunction and vomiting. The disease is life-threatening – mortality is as high as 10%. A vaccine offers complete protection for 10 years.

It is always possible that a country in a region currently infected with yellow fever requires a valid vaccination of anyone travelling in the country. Thus, anyone travelling to these regions should have

taken a vaccination against yellow fever in his home country before departure. All kinds of injections should be avoided in the developing countries because of the high risk of HIV or hepatitis infection from a contaminated needle.

Diphtheria

Diphtheria is a bacterial disease, which develops a widespread, festering, viscous yellow lining in the pharynx, nasal cavity and larynx. The bacteria produce a toxin, which may cause a variety of symptoms in the heart, kidneys and nervous system.

Diphtheria may spread as droplet infection, by kissing the infected person, or by sharing cutlery.

Vaccination is the best way to avoid the infection. If it has been over 10 years since the last vaccination, a booster vaccination is needed before travelling to regions with a risk of infection. Diphtheria can be cured with penicillin.

Salmonellosis

See Chapter 26 Vomiting, fever and diarrhoea > Illnesses causing diarrhoea.

Cholera

See Chapter 26 Vomiting, fever and diarrhoea > Illnesses causing diarrhoea.

Tuberculosis

See Chapter 25 Diseases of the airways.

SARS

See Chapter 25 Diseases of the airways.

AIDS/ HIV

See Chapter 31 Sexually transmitted diseases.

39 Diabetes

Diabetes is a metabolic disorder caused by inability of the pancreas to produce insulin (Type 1 diabetes in children and young adults), or the insufficient action of insulin and inadequate insulin secretion (Type 2 diabetes in adults).

1 Type 1 diabetes

Type 1 diabetes is mostly a disorder of children or young adults, but there is also a possibility of developing the illness later in life. Type 1 diabetes requires life-long insulin replacement therapy, because it is a consequence of the destruction of the insulin-producing pancreatic cells (e.g., after inflammation of the pancreas).

2 Type 2 diabetes

Type 2 diabetes is caused by insulin resistance, or the impaired action of insulin in the body. The pancreas produces insulin, but the body cannot use it effectively. The blood sugar level rises slowly, and in the beginning of the illness the patient usually does not have any symptoms at all. That is why Type 2 diabetes is often discovered by chance.

Most Type 2 diabetics suffer from a metabolic syndrome, which, in addition to diabetes, is manifested as obesity, the overweight accumulating especially in the abdominal region, high blood pressure, and abnormal blood fat values. The metabolic syndrome may be treated without medication, namely, by losing weight, following a low-fat and high-fibre diet, and physical exercise. It often takes only a slight, about 5–10 kg decrease in weight to essentially improve not only the blood sugar level, but also the high blood pressure and fat values. Some Type 2 diabetics control their illness merely by dietary changes and exercise,

without ever having to take medication. However, most patients need medication sooner or later.

3 Low blood sugar (hypoglycaemia)

The blood sugar is too low when there is more insulin in the body than is necessary. This often occurs in a situation when the patient takes his/her insulin medication, but has eaten less than usual, and that is why the dose of medicine lowers the blood sugar level more than needed, and the blood sugar consequently falls too much.

Typical symptoms are, for example, a feeling of hunger, faintness, dizziness, nervousness, shaking, sweating, pallor, palpitations, irritability, quarrelsome behaviour, unconsciousness and spasms. If the blood sugar level continues to fall, it leads to unconsciousness, which is referred to as insulin shock.

Raising a conscious patient's blood sugar level is done best by giving the patient rapidly absorbent sugar orally. Quick alternatives for raising the blood sugar level are: two table-spoonfuls of honey or syrup, 8 to 10 lumps of sugar dissolved in water, a small handful of raisins, a glass of fruit juice or a sugar-containing beverage, a banana, or a couple of apples.

The unconscious diabetic in insulin shock always needs immediate help. He/she may be given 1 mg of glucagon, injected either under the skin, or preferably, deep into the muscle, where it is absorbed more rapidly. The unconscious patient must never be given anything to drink because the liquid easily blocks the airways and the patient may suffocate. If there is no glucagon (8/C) available, and it is absolutely sure that the unconsciousness is caused by hypoglycaemia, the patient lying

on his side may be given a table-spoonful of honey spread on the mucous membranes inside the cheeks. If the patient's condition does not improve in 5 minutes, consulting a doctor via Radio Medical is necessary.

When the patient regains consciousness, his/her blood sugar level should be monitored with a blood sugar metre. After recovery he/she needs to be given long-lasting carbohydrates like dark bread and fruits.

4 High blood sugar (hyperglycaemia)

Insulin regulates the sugar metabolism in the body. Without insulin the body can not use the sugar properly, and the sugar concentration in the blood rises. The excess sugar passes through the kidneys into the urine, and is secreted in the urine, taking with it liquid and energy. The typical symptoms of hyperglycaemia are increased volume of urine, dehydration, increased thirst and weight loss.

In Type 1 diabetes, the symptoms are usually distinct and develop rapidly within days or weeks of onset. In the beginning, the Type 2 diabetic may have no symptoms for a long time, and the illness is often diagnosed by chance when the sugar level is measured.

If diabetes remains untreated for a long time, especially Type 1 diabetes, the blood sugar level may rise too high even in a short time, and so-called ketone bodies begin to accumulate. They are produced as a result of the incomplete burning of the fatty acids released into the bloodstream from the fat tissue. Typical symptoms are nausea, vomiting, abdominal pain, and a fruity odour of the breath due to acetone. The situation may lead to unconsciousness.

In Type 2 diabetes, the blood sugar level rises slowly, and the symptoms appear over a longer period of time. Typical symptoms are fatigue, listlessness and

susceptibility to inflammations. For example, recurring urethritis or inflammations of the skin are also possible. When the blood sugar level rises further, the classic symptoms of diabetes begin to develop: increased secretion of urine, thirst and weight loss. The patient's breath may smell of acetone.

Elevated blood sugar may be best assessed with a test strip from a drop of blood taken from the patient's fingertip. If the patient has clear symptoms, and the blood sugar is over 20 mmol/l, intravenous fluid therapy must be started together with the administration of 0.1 ml (= 10 units) of insulin (Insulin Actrapid 100 units/ml, 8/B) subcutaneously. When giving insulin, a syringe size of 1 ml must be used for adequate dosage. The blood sugar is measured hourly. Medical consultation is necessary before the administration of another dose of insulin.

Especially in Type 1 diabetes, large quantities of ketones may build up in the body, which may lead to acid poisoning, ketoacidosis. This is usually caused by neglecting the regular insulin injections or constant overeating, which leads to a rapid increase in the blood sugar concentration. The patient may be drowsy, even unconscious. The fruity acetone odour due to the ketones may be noted in the patient's breath. If prolonged, the condition may lead to drowsiness and unconsciousness. Type 2 diabetes, on the other hand, rarely leads to ketoacidosis. Ketoacidosis is always a severe condition and requires immediate transfer of the patient to shore.

5 Differentiating between low and high blood sugar

A diabetic may be unconscious either due to insulin shock (too low blood sugar) or, more rarely, ketoacidosis (too high blood sugar). The symptoms caused by too low and too high blood sugar levels are shown

III Symptoms and diseases and their treatment

in Table 7. If it is not known whether the condition is due to too low or too high blood sugar, it must be treated as a too

low blood sugar level. The body endures a high sugar concentration considerably better than a low one.

Table 7. Differences in the symptoms and signs of insulin shock and ketoacidosis

Too low blood sugar		Too high blood sugar
Sudden (sometimes preceded by disorientation)	Beginning	Slow, develops within (6–)12–24 hours
Excess insulin in the bloodstream: a meagre or delayed meal or missing a meal, excess physical strain especially before a meal, abundant consumption of alcohol	Cause	Insulin deficiency: neglecting the treatment, neglecting or forgetting the insulin injection, new diabetes
Cold, moist, sweaty skin, pale face	Externally visible symptoms	Dry, warm skin, often redness in the face, heavy breathing, fruity odour in the breath (acetone)
Nervous, aggressive, sometimes confused	Behaviour before unconsciousness	Drowsy, sometimes disoriented
Sweating (not always), shaking, feeling of hunger, faintness, sometimes nausea and vomiting, disorientation, spasms (often connected with unconsciousness)	Symptoms preceding unconsciousness	Strong thirst and dry mouth, headache, severe nausea, vomiting, abdominal pain, constipation, blurred vision, shortness of breath, fatigue
Low (under 3 mmol/l)	Blood sugar	High (usually over 15 mmol/l)
Sugar usually –, Acids – or weak +	Urine	Sugar ++++ Acids ++++
Glucagon 1 mg into muscle, if the patient is conscious: sugar/honey/syrup	Treatment	Always an emergency, intravenous fluid therapy, consultation via Radio Medical, insulin

IV TREATMENT PROCEDURES

- 40 Securing the airways, intubation
- 41 Measuring the blood sugar
- 42 The drugs in the ship's pharmacy and their use
- 43 Drug injections
- 44 Drug treatment of the eyes
- 45 Intravenous (IV) infusion therapy
- 46 Measuring blood pressure
- 47 Wounds
- 48 Retention of urine and catheterization of urinary bladder
- 49 Positioning, moving, and evacuating a patient
- 50 Cleaning hands and instruments

40 Securing the airways, intubation

One of the most important and urgent treatment procedures for a critically ill or injured patient is ensuring his/her breathing. The body's oxygen intake must be guaranteed, and a possible lack of oxygen has to be treated as efficiently as possible. The airways have to be opened and any obstruction removed. Breathing must be secured with a pharyngeal tube or by intubation, if necessary. If a patient is breathing weakly, his/her breathing is enhanced by giving extra oxygen with a face mask. When the patient is not breathing independently, the ventilation of the lungs has to be aided with mouth-to-mouth respiration, or with a breathing bag attached to a face mask or intubation tube.

● Ensure the patient's oxygen supply

- **by opening the airways**
 - turn the patient on his/her side
 - clear the airways with suction or by removing any obstruction from the mouth and pharynx with your fingers
- **by giving extra oxygen to a patient who is breathing independently**
- **by blowing air into a non-breathing patient, mouth-to-mouth or with a breathing bag connected to a face mask or an intubation tube.**

1 Securing the airways with a pharyngeal tube

Open airways are secured with a pharyngeal tube in the following way:

- Lay the patient down on his/her back and lift the patient's lower jaw upwards so that the head tilts slightly backwards, and the lower jaw (dental level) is positioned in front of the upper jaw.
- Check to see whether the patient is breathing, by feeling the movement of the air with the back of your hand and observing breathing movements.
- Make sure that there are no foreign objects in the mouth or pharynx and, when necessary, clear the mouth mechanically with your fingers or with suction.
- Insert the pharyngeal tube to keep the airway open.
- Secure the ventilation of the lungs via the pharyngeal tube by mouth-to-mouth respiration or by using a mask and a breathing bag when the patient's own breathing is weak or undetectable. The rate of blowing is the same as the resuscitator's own respiration rate (about 12–16 times a minute).

When breathing is assisted either mouth-to-mouth or with a breathing bag, the success of the air flow has to be monitored all the time by watching the movement of the patient's chest. If the chest is not rising although air is being blown in, then the air may be going into the stomach. Blowing must not be continued in the same way, until the position of the patient's head has been corrected. After correcting the position of the head, the blowing must be repeated, and it must be checked that the chest really rises during the blowing. When air is blown into the patient's stomach, it may induce vomiting and, as the patient is lying down, the contents of the stomach will go into the lungs. The pharyngeal tube does not prevent this. The result is severe

lung irritation that may even lead to life-threatening pneumonia.

2 Intubation

If the patient does not start breathing on his/her own, or requires more efficient long-term assistance, a breathing tube is inserted into the trachea (intubation). This is to make sure that the patient's airways definitely stay open and the breathing assistance is efficient. In addition, intubation prevents any stomach contents from going into the lungs.

Performing the intubation

Prepare the following equipment:

- Laryngoscope. Check first that the lamp is working (Figure 40).
- Endotracheal tube (size corresponds to the width of the patient's little finger). Adult sizes are 7, 8 or 9.
- Tape for attaching the tube.
- 10 ml syringe.

- Breathing bag. Make sure that the breathing bag can be attached tightly to the endotracheal tube!
- Pharyngeal tube.

Performing the intubation (Figures 41–46). Before beginning the intubation, make sure that there is enough room behind the patient's head. Calm yourself and proceed as follows:

- Take a good position (kneeling behind the patient's head and facing the patient).
- Put something under the patient's head to lift it (e.g. a pillow or a thick book) and tilt the head backwards (Figure 41).
- Hold the laryngoscope in your left hand and insert it into the patient's mouth, slightly slanted from the right towards the midline, or straight to the midline (Figure 42). The purpose of inserting the laryngoscope from the right side of the mouth is to move the tongue towards the left side to enhance visibility into the pharynx.



Figure 40. Intubation equipment

IV Treatment procedures



Figure 41. Tilt the head backwards



Figure 42. Insert the laryngoscope into the mouth with the blade in the midline

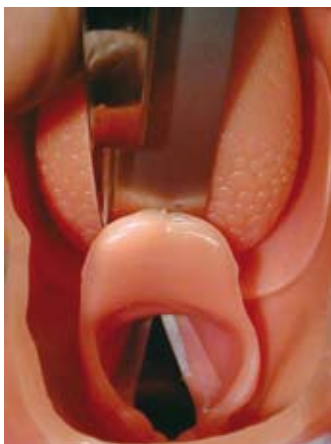


Figure 43. Lift the blade of the laryngoscope until you see the vocal cords

Figure 44. Insert the endotracheal tube to the right depth



Figure 45. Inflate the cuff of the endotracheal tube with air, with a syringe



Figure 46. Attach the breathing bag to the endotracheal tube and begin to give air



- Slide the blade of the laryngoscope into the pharynx. The laryngoscope has been correctly placed if the whole length of its blade eventually touches the patient's tongue. The blade is in deep enough when your hand touches the patient's chin.
- Begin lifting the laryngoscope handle upwards along the line of the handle.
- Visualize the vocal cords that are located uppermost, deep in the pharynx ('white sails', Figure 43).
- Guide the endotracheal tube with your right hand into the airways so that the scale on the tube at the level of the corner of the patient's mouth shows 22 at most for men, and 20 at most for women (Figure 44).
- Inflate the air cuff of the tube by pushing 10 ml of air with a syringe into the cuff (Figure 45). Attach the tube to the corner of the patient's mouth with tape. Make sure that the tube remains at the right depth the entire time!
- Begin giving oxygen with a breathing bag (Figure 46).
- Listen to both lungs with a stethoscope to make sure that breath sounds are heard from both lungs.
- Insert a pharyngeal tube to prevent the possibility that during a spasm the patient bites the endotracheal tube in two.

Possible problems in performing intubation

Intubation is often a life-saving procedure. However, problems may occur in performing the intubation. The most common problems are:

- The lamp of the laryngoscope is not working, or gives only a dim light.
- The blade of the laryngoscope is not in the middle of the tongue or on the right side, and the patient's tongue does not move aside sufficiently.
- The larynx does not come into sight (continue ventilation with the mask!).
- The performance is hasty. Try again in a very calm manner, following the instructions.
- Breath sounds can be heard from one lung only. This means that the tube is too deep and the air is going only into the right lung. Deflate the cuff and gently pull the tube out a couple of centimetres. Inflate the cuff, blow and check the breath sounds again.

41 Measuring the blood sugar

Normal fasting blood sugar measured from a drop of blood taken from the fingertip, is considered to be between 3.5 and 5.5 mmol/l (the person has fasted 6–8 hours prior to the test).

In instant tests, the blood sugar is determined from a drop of blood with a test strip (e.g. Glucotest®). A healthy person does not secrete sugar into his/her urine. Consequently, measuring the amount of sugar in urine does not help in determining the blood sugar level of a healthy person. If a person has diabetes, his blood sugar level rises and sugar starts to secrete into his/her urine. However, even in a diabetic patient the amount of sugar in urine does not indicate the current blood sugar level of the patient's blood. It merely tells that the blood sugar level has at some point been too high and has crossed the person's individual renal threshold, at which point sugar starts to secrete into the urine. In the case of diabetic patients, the secretion of sugar into the urine is a sign of a poorly managed disease. When diabetes is treated well, no sugar is secreted into the urine.

Every test strip kit meant for measuring blood sugar contains precise instructions. They must be read carefully before measuring, because different manufacturers' instructions give different handling methods and times. The instructions given here are mostly suggestions. The instructions concerning the test strips that are used dictate the actual steps of the procedure.

- **Follow the instructions for using the test strips carefully.**

The equipment needed for measuring blood sugar: an injection needle or lancet,

absorbent paper towel or tissue, the test strip kit, and a watch (Figure 47). The blood sugar is measured as follows:

- Wear protective gloves.
- Take the test strip from the container and close the container immediately.
- Clean the tip of the patient's middle finger with a cleansing swab and let the fingertip dry.
- Take a firm grip of the fingertip and prick a hole with an injection needle or a lancet on the side of the fingertip about 5 mm from the edge of the nail (Figure 48). The hole has to be big enough for a drop of blood to come out by itself. The fingertip should not be squeezed.
- Wipe off the first drop of blood and let a new drop form.
- Touch the drop of blood with the indicator head of the test strip so that the whole indicator area is wet (Figure 49).
- Follow the instructions and time guidelines of the test strip kit carefully when handling the strip.
- After waiting for the colour reaction for exactly the length of time stated in the instructions, compare the colour with the test colours on the container (Figure 50). The patient's blood sugar level is determined by comparing the colour of the test strip with the colour squares on the side of the container.

In case of an emergency, the patient's skin can be left uncleaned. However, the fingertip must always be dry. Always and in all situations avoid skin contact with the patient's blood.

IV Treatment procedures



Figure 47. Clean the fingertip with a cleansing swab



Figure 48. Prick a hole on the side of the fingertip with a needle or lancet



Figure 49. Wet the test area of the test strip with a drop of blood



Figure 50. Compare the colour of the test strip with the colour scale on the container

42 The drugs in the ship's pharmacy and their use

There are no international regulations concerning the content of a ship's medicine chest. Nearly every country has issued its own regulations determining the medicines the ship under the flag of that country must have on board. The European Union (EU), in its directive 29/92 EC determines the groups of medicines which the ships in the European Union must have. Though the medications listed in this book comply with the EU directive mentioned above, all of them might not be widely used in all the EU countries.

Each drug is named according to the non-proprietary name (so-called generic name). The generic name makes it possible to identify different parallel preparations. As the trade names vary in different countries, you need to know the generic name of the drug when purchasing drugs from abroad.

Drugs come in many different forms: tablets, suppositories, mini-enemas and injections. The fastest effect is obtained with an injection given intravenously, and the slowest when a tablet is taken orally. A glass of water must be drunk when swallowing a tablet. Otherwise the tablet might get stuck in the gullet.

One whole disposable ampoule of a drug usually corresponds to a single adult dose (the neck of a glass ampoule is broken when it is opened). The exception to this rule is a morphine ampoule, which should not be given all at once but, for example, in three parts, at intervals of a few minutes. A large single dose of morphine could result in respiratory failure.

A drug in liquid form may also be in an ampoule with a rubber cork, and can be taken in doses from the ampoule. Good hygiene must be maintained when

handling the ampoule, so that the drug in the ampoule remains sterile.

1 Drugs, pregnancy and breast feeding

Certain drugs can harm the developing foetus. Pregnant women should therefore be given drugs with caution. In all treatment situations, it should be carefully considered what drug to use or, if in fact, the patient could manage without any drugs. The majority of drugs pass into the foetus from the mother's blood circulation. However, sometimes treatment with drugs is necessary, and the risk to the baby is smaller with the drug than without it.

National and international catalogues always state whether a drug causes or might cause risks to the foetus, and whether it is suitable for use by breast-feeding mothers. If the drug catalogue does not definitely state whether the drug can be used or not, a doctor must always be consulted before administering medication to a pregnant woman.

- **Consider carefully before giving drugs to a pregnant woman. Ask a doctor for instructions!**

2 Fatigue-causing 'triangle' drugs

Some drug packages in the ship's pharmacy have a red warning triangle. The triangle indicates that the drug has been found to cause fatigue and to lower attentiveness. Drugs marked with the red triangle must not be used at all if a person's work duties require unconditional alertness (e.g. helm or watch duty).

Triangle drugs and alcohol should not be taken simultaneously. When used together they have a depressive effect on the central nervous system. Their combined effect can be totally unpredictable, ranging from depression to an episode of aggressiveness. Alcohol and a tranquillizing drug enhance each other's effect and may together lead to an unexpected lapse in judgment and perception.

The effect of a triangle drug may last a considerably long time. For example, diazepam taken in the evening can still have an effect the following morning.

There are no contraindications to using triangle drugs if the patient is unable to work because of his/her illness or injury. For example, diazepam (4/A) causes fatigue and relieves anxiety but, at the same time, eases muscle tension and spasms. When treating a painful muscle cramp, lumbago for instance, diazepam and a painkiller is a good combination.

It must be borne in mind that all drugs may cause fatigue. The illness itself can also cause tiredness. These factors must be taken into account when assessing a sick person's ability to work.

3 The harmful effects of drugs

All drugs can have harmful effects. The beneficial and harmful effects of triangle drugs often go hand in hand. Tranquillizing and causing tiredness are beneficial effects of a drug for a restless person, but they are harmful for persons working in positions requiring precision and alertness.

Some drugs irritate the stomach (e.g. painkillers and fever medicines) and some cause diarrhoea (e.g. anti-inflammatory analgesics and antibiotics).

One common harmful side effect of a drug is an allergic reaction. When a drug is used locally (e.g. creams for treating rash, analgesic cream) the allergy appears as

itching and reddening of the treated skin area, which become worse as the treatment is prolonged.

The allergic reaction caused by drugs used internally may appear in many different forms, ranging from symmetrical rash to fever, skin and lip swelling, elevated pulse, breathing difficulties and anaphylactic shock. A similar reaction can be caused by any other ingested substance as well (food, drink).

- **Suspect an allergic reaction if, during medical treatment, the patient develops a symmetrical rash or suffers from breathing difficulties which become worse as the treatment continues.**

The treatment for a sudden allergic reaction with severe symptoms is always an adrenaline injection (1 mg/ml, 8/A) given intramuscularly or intravenously (see below). The dose for a normal-sized adult is one ampoule (1 mg) of adrenaline (1 ml). Only after this proceed to other treatments.

- **The primary treatment for a sudden allergic reaction with severe symptoms is always an adrenaline injection.**

If the patient is able to communicate and is still breathing with relative ease, the adrenaline injection can be administered intramuscularly. An intravenous injection is recommended when the situation is really serious, the patient's breathing is shallow, and he/she is pale and nauseous. Instead of spending time trying to find a vein, the injection can be given into the tongue because it has good blood circulation, and the drug is effectively absorbed. You can get a good grip on the tongue by holding it with a piece of paper or cloth. The dose can be administered again in 10–20 minutes, in case the first injection did not help.

- **An injection into the tongue is always successful and efficient.**

After primary treatment, continue to treat the patient either by giving him/her hydrocortisone intramuscularly or prednisolone tablets orally. At this stage consult a doctor via Radio Medical.

- **After primary treatment, consult a doctor about further treatment via Radio Medical.**

The use of the drug that possibly caused the allergic reaction should be discontinued immediately. Furthermore, try to find out whether it was the drug or some other simultaneous factor that may have caused the reaction. If the reason for the reaction was a drug allergy, the patient must never again be given that drug!

4 Drugs and alcohol

Alcohol enhances the effects of drugs that have a depressing effect on the central nervous system ('triangle drugs'). Their combined effect can be unpredictable, and may even lead to respiratory arrest. This should be kept in mind, for example, when administering drugs to a person under the influence of alcohol. That is why a drunken patient has to be monitored very carefully during his/her treatment.

- **Drugs and alcohol must not be used simultaneously.**

Alcohol causes gastric irritation. It therefore increases the harmful effects of drugs that irritate the stomach (e.g. painkillers and antipyretics).

Alcohol reduces the motility of the gastro-intestinal tract, which may weaken the absorption and effect of some drugs. If a person uses alcohol, he/she often neglects to follow the instructions for drug use.

43 Drug injections

An injected drug takes effect more quickly than an orally given drug, and the dosage is more accurate. This method of medication can also be used when the patient's condition does not allow other medication methods.

1 Preparatory procedures

Drugs are packed either in glass ampoules, the neck of which needs to be broken in order to use the drug, or in injection bottles from which the drug is drawn with a syringe and a needle through a rubber cork.

- **When giving an injection you need:**

- **the drug**
- **suitable-sized syringe and two needles**
- **cleansing swabs for cleaning the injection bottle and the skin.**

When the equipment is ready, proceed in the following way:

- **Make sure that the drug bottle contains the correct drug preparation, and that the concentration of the drug (mg/ml) is correct!**

- Check the date on the package to see that the last date for using the drug has not expired.
- Check how large a dose of the drug is required.
- Take a syringe and attach a needle to it.
- Injection bottle:
 - Carefully clean the rubber cork of the injection bottle with a cleansing swab.
 - Draw the same amount of air into the syringe as drug will be taken from the injection bottle.
 - Push the needle through the rubber cork. Inject the air into the bottle.
 - Draw the correct amount of drug into the syringe.
 - Remove any air that may have entered the syringe when drawing the drug in and replace the needle by a new, clean, dry one.
- Drug ampoule:
 - Move the drug from the ampoule neck to the bottom of the ampoule by gently tapping it.
 - Wipe the neck of the ampoule and break it.
 - Draw the amount of drug needed into the syringe with a needle.
 - Remove any air that may have entered the syringe when drawing the drug in.
- Clean the area of the patient's skin where the injection is to be given with an alcohol swab.
- Give the injection.

2 Giving the injection

An injection can be given under the skin (subcutaneous injection, s.c.), into a muscle (intramuscular injection, i.m.) or into a vein (intravenous injection, i.v.).

Subcutaneous injection

A subcutaneous injection is used, for example, when giving insulin. The most

common site for an injection is the outside of the upper arm. A fold of skin is taken between the thumb and the index finger, and the skin is pierced at a 45 degree angle, so that the needle tip goes in to the correct depth (subcutaneous tissue). Check that the needle has not pierced a blood vessel. This can be done by either detaching the syringe from the needle or pulling the syringe piston outwards. If blood does not come out, the needle is at the right depth and the drug injection can be slowly given. After this, the needle is carefully pulled out and, when necessary, the site of injection is pressed for a short time with a pad in order to keep the drug from dripping out.

Intramuscular injection

A drug is absorbed much more quickly if it is given intramuscularly rather than subcutaneously. The most common site for the injection is the outside of the outermost quarter of the buttock or the thigh muscle on the outside of the thigh. The sciatic nerve runs closest to the midline of the buttock and it is necessary to be very careful not to damage it. When giving the injection, the muscle has to be as relaxed as possible in order for the injection to be painless.

The syringe is held like a pen, and is thrust perpendicularly into the skin and through it into the muscle. Check to see that the tip of the needle has not struck a blood vessel (see above). Then inject the drug slowly into the muscle. The needle is pulled out and, when necessary, the injection site is pressed for a short time with a pad.

Intravenous injection

A drug given intravenously takes effect in seconds. Because the drug is given intravenously, there is risk of blood contact in this method. The person giving the drug should therefore use protective gloves. The administration technique for intravenously given drugs is for the most part the same as

in intravenous fluid replacement therapy:

- Clean the injection site with an alcohol swab.
- Place a tourniquet on the forearm or upper arm to slow down venous blood flow and thus distend the veins.
- Push the needle of the drug-containing syringe through the skin into the vein. Ensure that the needle has struck the vein by pulling the syringe piston outwards; if the needle is in the vein, blood flows into the syringe.
- Open the tourniquet.
- Inject the drug slowly into the vein, taking care to keep the needle steady. Moving the needle easily causes it to come out of the vein and the injection fails.
- After giving the drug, first pull the needle out of the vein and then press

on the vein with a pad for about five minutes to control bleeding.

- When necessary, put an ordinary wound plaster (band-aid) on the injection site.

3 Handling the equipment after injecting the drug

Used needles and syringes must not be thrown into an ordinary rubbish bin. They must be collected in a glass or plastic jar or bottle reserved for the purpose, and taken off the ship according to the instructions of the shipping company. Used cleaning pads are handled like normal waste.

44 Drug treatment of the eyes

The eyes are most often treated locally with eye drops or ointments to the palpebral fissure (under the lower eyelid). The drops have a fast but usually short-lasting effect. The drug is released more slowly from eye ointments and is not diluted by the tear fluid as easily as eye drops.

Eye medications or drug packages are personal. An opened eye drug remains usable for one month when stored as instructed. The date of the opening of the package should always be marked on the package so that the time period during which the drug is usable is known.

Eye drugs are administered into a clean eye. If there is any discharge in the eye lashes or eyelids, the eye is cleaned before medication either by washing with water or saline solution, or by gently wiping it clean.

1 Eye drops

Eye drops are given in the following way:

- The person giving the drops washes his/her hands.
- Check that the drug to be used is the correct one. The date of the opening



Figure 51. Eye drops are dropped into the opened lower eyelid

of the drug bottle must be marked on the bottle.

- The patient bends his/her head backwards and looks up. In this position the sensitive cornea is partly under the upper eyelid and the drop will not hit it.
- The lower eyelid is pulled downwards.
- One drop of the medication is dropped into the palpebral fissure of the lower eyelid (Figure 51). If the drop hits the eye only partly, another drop is given. Be careful not to touch anything with the tip of the drop bottle: not the patient's eyelashes or eyebrows, and not the fingers of the person giving the drug.
- The patient closes his/her eyes gently.
- Wipe off the extra drug from the palpebral fissure with a sterile swab.
- The drop bottle is closed so that the edge of the cork does not touch the mouth of the bottle. The drug is stored according to the instructions on the package. (Remember the expiry date!)

2 Eye ointment

Eye ointment is packed in small tubes equipped with a long nozzle. Since the ointments at first blur the vision slightly, they are generally applied for the night. Eye ointment is applied in the following way:

- The person applying the ointment washes his/her hands.



Figure 52. Eye ointment is applied into the opened lower eyelid

- Check that the drug is the correct one, and that the use-by date has not expired.
- The patient bends his/her head backwards and looks up.
- The patient's lower eyelid is pulled downwards.
- 0.5–1 cm of ointment is squeezed from the tube onto the inner surface of the lower eyelid, so that the tip of the tube does not touch the eyelid (Figure 52).
- The patient closes his/her eyes gently, after which he/she gently blinks the eye so that the ointment forms a light membrane on the conjunctiva and cornea.
- Any extra ointment is wiped off with a sterile swab.
- Before closing the ointment tube, squeeze out a small amount of ointment and wipe the tip of the tube with a clean, sterile swab. This helps to keep the drug sterile.

45 Intravenous (IV) infusion therapy

Inserting an intravenous (IV) catheter and starting intravenous infusion is necessary in many diseases and accidents. Intravenously given fluid replacement, in other words, intravenous infusion, may save the patient's life. If a patient is in danger of going into shock (insufficient blood circulation for the body's needs), for example, due to severe diarrhoea, vomiting, bleeding or burns, the situation can be stabilized with intravenous infusion therapy. It is also possible to administer medications via the intravenous catheter, when the patient cannot take them orally (due to stomach pains or vomiting) or when the medication has to take effect quickly.

1 Intravenous infusion

Necessary equipment

The equipment needed (Figure 53) must be assembled before beginning the IV therapy. These are:

- protective gloves
- intravenous solution (basic intravenous fluid, either in a bag or a bottle)
- stand for the solution bag/bottle
- IV administration set
- tourniquet
- catheter
- antiseptics for disinfecting the skin
- adhesive skin tape.

Priming the tubing

First, prepare the IV administration set for use:

- Close the roller clamp on the IV set, and insert the spike of the IV set into the solution bag or bottle. With a bottle, the air vent of the drip chamber should be open; with a bag, closed.
- Squeeze the drip chamber of the IV set half full of fluid (Figure 54).
- Open the roller clamp, so that the tubing is filled with fluid and all air bubbles are expelled.



Figure 53. Equipment needed for intravenous infusion



Figure 54. Filling the drip chamber

- Close the roller clamp and suspend the tubing on the IV stand.

Inserting the catheter into a vein (Figures 55–59)

There is a risk of blood contact with the patient when the vascular access is being opened. The use of protective gloves is thus necessary. The lighting should be good during the procedure.

Procedures in inserting the catheter:

- Wrap the tourniquet around the patient's forearm or upper arm. The veins at the back of the hand, especially the y-branches of veins, are the best insertion sites (Figure 55). Veins that are poorly visible can be brought out by tapping them gently with the fingers, massaging a cool limb, or lowering the limb slightly.
- Clean the insertion site thoroughly with an antiseptic swab, from the centre outwards.

- Take the IV catheter from its package and spread out its wings.
- Stretch the skin at the insertion site tight with a thumb, to stabilize the vein during insertion.
- Grip the catheter with the other hand (Figure 56).
- Pierce the skin with the catheter at a 30–45 degree angle to the skin on top of the vein, in the direction of blood flow (towards the heart). When the catheter has pierced the skin and the wall of the vein, direct it into the vein parallel with the skin. When the tip of the catheter has pierced the wall of the vein, blood will appear in the chamber of the catheter.
- Push the catheter into the vein about 0.5–1 cm. Then pull the metal needle inside the catheter (not the plastic catheter!) outwards about 1 cm and push the plastic catheter fully into the vein.
- Open the tourniquet, press the vein with a finger and remove the metal needle (Figure 57).

Joining the IV administration set to the catheter and starting infusion

Next, attach the prepared IV tubing to the catheter as follows:

- Remove the protective cap from the end of the tubing and attach the tubing to the catheter (Figure 58).
- Tape the catheter with its wings to the skin.
- Make a loop in the tubing and tape it to the skin (Figure 59). The loop will prevent dislodgement of the catheter if the tubing is touched.
- Hang the IV bottle or bag above the patient and open the roller clamp.
- Adjust the roller clamp for the proper flow rate. The flow rate is determined by counting the number of drops in the drip chamber per minute (20 drops = 1 ml). The infusion rate depends on the situation: a bleeding shock may require as much as 200 drops/min,



Figure 55. Wrap the tourniquet around the forearm and clean the insertion site with an antiseptic swab



Figure 56. Push the catheter into the vein; blood should appear in the chamber of the catheter



Figure 57. Pull the metal needle inside the catheter outwards, and then push the plastic catheter deeper into the vein

while a standard flow rate is 15–20 drops/min.

- Monitor the infusion constantly, and record the amount of fluid given and the infusion rate on the patient's follow-up form.

● **Consult a doctor via Radio Medical about the infusion rate and total amount of fluid.**

If the infusion is continued after the first bottle or bag is empty, make sure that when changing the bottle or bag, the drip chamber of the IV set is half full and the tubing is full of fluid, so that no air gets into the patient's circulation.

There is a plug on top of the catheter into which the tip of a syringe fits. Through this, it is possible to administer medications directly into the vein, if necessary.

The infusion does not work. What is the problem?

If the fluid does not seem to flow from the tubing into the patient, the reason may be:

- The roller clamp is closed – open the roller clamp.
- A bend in the tubing prevents the flow of fluid – straighten the bend.
- The infusion bottle or bag is set too low, and thus the infusion pressure is too weak – move the infusion bottle or bag higher.
- The catheter is not in the vein but, for example, under the skin – insert the catheter at a new site, usually above the previous insertion site.
- A blood clot has blocked the needle – rinse the catheter by injecting sterile 0.9% saline through it, or insert a new catheter at a different site.

Figure 58. Press the catheter with a finger and connect it to the tubing



Figure 59. Secure the catheter in place with skin tape and start the infusion



46 Measuring blood pressure

A normal blood pressure is 120–140 / 70–85 mmHg. The upper, systolic value represents the pressure in the arteries when the heart is contracting. The lower, diastolic value represents the pressure in the arteries between the contractions of the heart. If blood pressure is measured carelessly and hastily, the readings can be even 10–20 mmHg higher than the real values.

The blood pressure is higher when a person is standing, lower when sitting down, and lowest when lying down. Anxiety, tension, and pain, as well as many diseases, and physical exertion raise the blood pressure.

1 Measuring instruments

Sphygmomanometer (blood pressure gauge)

In a sphygmomanometer meant for adults, the rubber bag part of the cuff should be at least 14 cm wide and 40 cm long.

Stethoscope

When you place the stethoscope in the ears, make sure that the angle of the earpieces is slightly upwards, in the same direction as the ear passage. If the angle is downwards, hearing is weakened as the earpieces point towards the wall of the auditory passage.

Most stethoscopes have both a bell and a diaphragm mode for auscultation. Make sure before the measurement that you have chosen the right side of the chest piece for listening. This can be checked by lightly tapping with the fingers the side that will be placed on the patient. If you can hear the sound via the earpieces, measurement is possible.

2 Measuring blood pressure with a stethoscope

Blood pressure should be measured in a quiet environment. Furthermore, before the measurement, the patient should be allowed to relax for 10–15 minutes, so that the measuring situation corresponds to the patient's normal condition.

Procedures for measuring blood pressure from the arm:

- Remove any clothing that constricts the arm. Preferably the whole arm is bare during the measurement.
- Wrap the deflated cuff snugly around the upper arm. Start wrapping from the rubber bag part, ending with the Velcro tape. The air tubing from the cuff should point toward the patient's wrist. The tubing should not cover the elbow fold, from which you listen to the pulse with the stethoscope.
- Make sure that the chest piece of the stethoscope is in auscultation mode and place it at the middle of the elbow fold over the artery.
- Pump air into the cuff and follow the pressure from the sphygmomanometer. Raise the pressure about 30 mmHg higher than the patient's assumed blood pressure level.
- Lower the cuff pressure slowly by deflating (about 2 mmHg decrease in pressure per second).
- Follow the meter reading; at the same time listen with the stethoscope for the appearance and disappearance of the pulse as the pressure decreases.
- Lower the pressure steadily, without interruptions, until the pulse is no longer audible. Do not raise the pressure again

in the middle of the measurement. All pressure must be released before starting remeasurement.

The measurement reading is based on auditory observation. When the cuff pressure decreases to the level of systolic pressure, blood starts flowing into the brachial artery with the pulse. This is heard as a low, pulsating sound. Record the reading at which the sounds are first audible (systolic pressure).

When the cuff pressure decreases further, the pulsating sound becomes distant and disappears completely, as blood flows freely in the brachial artery. Record the reading at which the sound of the pulse disappears completely (diastolic pressure).

3 Repeating the measurement

The measurement should be performed at least twice. Deflate the cuff completely between measurements, and take a new measurement after a few minutes.

4 Measuring blood pressure without a stethoscope

Diastolic blood pressure can be determined only with a sphygmomanometer and a stethoscope. However, it is possible to measure the systolic pressure even without a stethoscope. Take the reading by feeling the wrist pulse at the same time as you deflate the cuff. Systolic pressure is the pressure level when the wrist pulse becomes perceptible.

5 Estimating blood pressure without a gauge

In an emergency situation, it is possible to make a rough estimate of blood pressure even without a sphygmomanometer by feeling the pulse in both the wrist and the carotid artery (at the neck). If the wrist pulse is perceptible, blood pressure is over 80 mmHg. If the wrist pulse cannot be detected, but the carotid pulse is still perceptible, blood pressure is at least 60 mmHg. Feel the pulse with the tips of the index and middle finger. The pulse should not be felt with the thumb, because then the measurer's own pulse is also felt.

47 Wounds

A wound is a skin injury which may also involve damage to deeper tissues.

1 Different types of wounds

Healing of a wound depends on the type, size, location and cleanness of the wound, and how quickly it is treated.

A **scratch or abrasion** results from, for example, a graze or a fall. When capillaries are broken, blood trickles from the wound. Treat the wound by cleaning it properly with water and an antiseptic, and then cover it with a clean dressing.

An **incised wound** is caused by a sharp, cutting object such as a knife. The edges of the wound are clean. The wound penetrates to the subcutaneous tissue and

bleeding may be profuse. Nerves and tendons may also be damaged. Close the wound, depending on its size, either with skin strips or stitches. Cover it with a sterile, absorbent dressing. Consult Radio Medical if you suspect nerve or tendon injuries.

A **puncture wound** is caused by a stab with a sharp object, and is often very dangerous. Visible bleeding may be minor, but deep in the body there can be internal bleeding, and even severe tissue and organ damage. The risk of infection is high. If a puncture wound penetrates a lung, the lung may collapse. Thus, it is important to move the patient to shore for further treatment as soon as possible.

In a **shot wound**, the entry wound is usually small, but the exit wound is large and ragged. Visible damage may be small, but internal damage caused by a bullet is nevertheless often severe. Do not close puncture or shot wounds with stitches, since it is impossible to evaluate the depth of the wound and possible internal damage on board.

Especially puncture and shot wounds can be life-threatening, regardless of their appearance.

● Consult a doctor via Radio Medical!

A **contused wound** is usually caused by a blunt object. The tissue around the edges of the wound is bruised and the edges of the wound are ragged. The wound may bleed profusely, and risk of infection is high.

If the wound is in a limb, it is imperative to check that the limb functions normally, the fingers and toes move, and their sense of touch is not impaired. Determine whether the circulation functions normally by feeling the pulse at the extremities of the limb. If the wounds are in the head, remember the possibility of a fractured skull.

A **bite wound** usually results from a bite by an animal or a human being. The

risk of infection is very high, so antibiotic treatment is usually necessary, in addition to cleaning and dressing the wound. A bite wound should not be closed with stitches, because of the risk of infection.

2 Treatment of wounds

Stopping bleeding

Stop minor bleeding by dressing the wound, and use stitches, if necessary. Major external bleeding must be controlled as soon as possible, since arterial bleeding can cause the patient to lose a large amount of blood in a short time.

Always use protective gloves when treating wounds. This way you will not introduce any additional infectants into the patient; at the same time you protect yourself from possible diseases transmitted by blood (e.g. hepatitis and HIV).

● Always use protective gloves when treating wounds! Infection risk!

Raise the bleeding limb above the patient's heart level. The wound area should not be touched, unless this is necessary because of profuse bleeding. If the blood comes out in spurts, the wound can be pressed directly with thumb, fist or palm. Place a clean dressing over the wound, and on top of it, e.g. a roll of bandage as a pressure bandage, and then bind the wound snugly with an elastic bandage. Monitor the status of the patient to make sure that the bleeding stops. The bandage should not be so tight that the fingers or toes start to tingle or turn cold and bluish. An injured upper limb can be supported in an elevated position with a triangular bandage (Figure 60).

A tourniquet should generally not be used. It is an extreme treatment method, and should be used only in cases when a limb is amputated or crushed in several places, and there is no other way to stop the bleeding.

There are risks associated with the use of a tourniquet. Since a tourniquet is helpful only when it is so tight that the circulation in the whole limb is blocked, the tissues in the extremity may become damaged from lack of oxygen. Furthermore, a tourniquet causes intense pain in the limb. A tourniquet that is too loose prevents only venal circulation, and the patient will lose blood through the arteries faster than when a tourniquet is not used.

Cleaning a wound

Incised wounds caused by sharp objects do not usually require any special cleaning, so they can be closed immediately. If there is dirt or debris (e.g. sand) in the wound, it must be removed first before other treatment is given.

A particularly dirty wound should first be washed properly in running water. A less dirty wound can be cleaned by rinsing with sterile antiseptic solution, which is injected into the wound with a syringe and injection needle. The dirty area around the wound can be cleaned with soap and water. However, do not let the soap get into the wound itself.

Dressing a wound

After cleaning, place a gauze dressing over the wound. Place a non-adherent pad next to the wound to make it easier to change the dressing. Never put cotton wool directly onto a wound, since it is difficult to remove later. Place sterile gauze dressings over the initial dressing or pad and secure them with tape or bandage. If the wound bleeds, the bleeding can be reduced by moistening the lowermost dressings with blood-vessel-contracting nasal solution (6/D). Bleeding can also be stopped with a pressure bandage: place an unopened gauze roll over the lowermost gauze dressings and press it against the wound by wrapping an elastic bandage around it.

The injured area should be kept in an elevated position, because this facilitates



Figure 60. The upper limb can be effectively supported with a triangular bandage

the blood flow back to the heart and thus reduces bleeding and swelling of the injured area, and eases pain.

If the wound is clean and does not bleed through the dressings, the dressings can be left on for even a week. The dressings should not be allowed to get wet. If the dressings nevertheless get wet, they should be changed immediately for dry ones. You can leave the lowermost non-adherent pad unchanged and change only the dressings over it. It is easier to remove dressings if they are moistened before removal.

If there is substantial secretion from the wound, and especially if the secretion increases or the wound area becomes sore or reddened, the dressings should be opened daily to clean the wound (see *Cleaning a wound*).

Closing wounds

A wound heals more quickly and the growth of scar tissue is reduced, if the edges of the wound are brought together. If the edges of the wound are relatively clean and cannot be kept together with a dressing, try to close the wound with skin strips or with stitches.

Usually a wound should be closed as soon as possible, within six hours of the incident at the latest. If it is done later, the edges of the wound must be treated first. In such a case the wound should be closed by a doctor.

Closing a wound with hair

Wounds on the scalp can be closed using the patient's own hair (Figures 61 and 62). Place a thread (suture thread, ordinary sewing thread is also suitable) in the wound parallel to it. Take some hairs from both sides of the wound and pull them transversely across the wound to draw the edges of the wound together. Next, tie the hairs tightly together with the thread placed in the wound, so that the hairs from opposite sides of the wound stay fastened together and, at the same time, keep the edges of the wound together. If necessary, repeat this at several points of the wound to close it along its full length. Leave the bindings on for about 10 days.

Closing a wound with skin strips

In hairless skin areas, a wound can be closed with skin strips (Figure 63).

Carefully remove any hair around the wound to allow the skin strips to attach better. Do not, however, touch the edges of the wound. Clean the edges with chlorhexidine solution and allow them to dry.

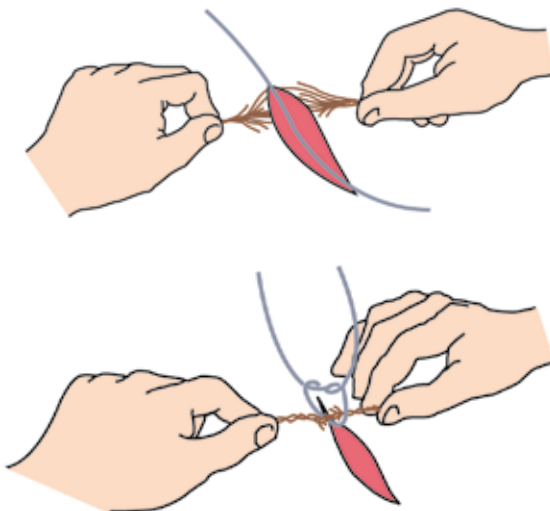
Attach one end of the skin strip to one side of the wound. Draw the edge of the wound towards the other edge with the strip; at the same time, support the other edge with the fingers. When the edges of the wound touch each other, attach the other end of the strip to the skin on the opposite side of the wound.

The edges of the wound should touch each other lightly. Avoid unnecessary tightening. The length of skin strip should be about 2–3 cm on either side of the wound.

The stability of the skin strips can be ensured by placing an additional strip across the ends of the strips. Keep the wound dry as long as the strips are kept on, usually for 7–10 days.

Closing a wound with stitches

Sometimes the methods described above are not enough, and the wound must be closed with stitches (sutures).



Figures 61 and 62. A head wound can be closed with the help of the patient's own hair

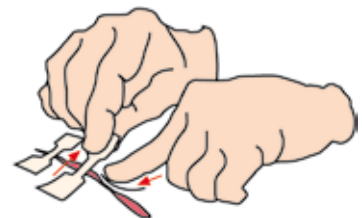


Figure 63. A wound can be closed with skin strips

- **Consult a doctor via Radio Medical before closing large wounds, puncture wounds or bite wounds.**

Equipment

Before beginning, assemble the following equipment (Figure 64):

- antiseptics for disinfecting the skin
- anaesthetic equipment: syringe, 2 needles, local anaesthetic
- sterile gloves (2 pairs)
- surgical drape with a hole
- instruments: surgical forceps, needle holder, scissors
- suture thread
- gauze dressings and bandages, skin tape.

After the wound is cleaned, put new, sterile gloves on before you start closing the wound.

Anaesthetizing the wound

First anaesthetize the edges of the wound with lidocaine (10 mg/ml, 13/A, Figure 65). Inject local anaesthetic with a thin needle into the skin and immediately below it around the edges of the wound at one or more injection sites, so that the treatment area is sufficiently anaesthetized. The total amount of anaesthetic should not be over 20 ml. Wait for 10 minutes for the anaesthetic to take effect. After this the wound should be cleaned again.

Begin stitching by pushing the needle with the needle holder at a right angle through the skin at the edge of the wound (Figure 66). While pushing, turn the needle so that its tip comes out through the skin of the other edge of the wound. If the length of the needle is not sufficient for this, turn the needle so that its tip appears in the middle of the wound. Then grip the needle again and continue the stitch from inside the wound through the skin of the other side of the wound (Figure 67).

Generally use simple interrupted stitches. Each stitch is tied individually with a reef knot (Figures 68 and 69). The stitch should be made so that the edges of the wound only just touch each other. The number of stitches required depends on the length of the wound and on how easy it is to keep the edges of the wound together (Figure 70).

When the stitches are ready, cover the wound with a sterile gauze dressing and secure it. The stitched wound must be kept dry.

Removing stitches

Stitches are removed after 5–10 days, depending on the location of the wound (from the face sometimes even after three days to prevent excessive scar formation, whereas the stitches on a wound on a thick-skinned palm, for instance, can be left for even a couple of weeks).

Lift a stitch with the forceps so that you can cut it between the knot and skin, either with scissors or with a stitch cutter. Next, pull the stitch from the skin.

3 Infected wound and lymphangitis (infection of lymph vessels)

Symptoms of an infected wound include redness and swelling of the edges of the wound, hotness, ache or pain, and pus draining from the wound. The patient may also have fever.

Remove all dressings from the infected wound and clean it twice a day by rinsing with warm water. Cleansing can be assisted by mechanically scratching the pus away, e.g. with a clean cotton stick. After cleaning, spread bacitracin ointment (9/D) on the wound. Always apply new dressings after treatment. If the infection does not subside in a few days, or if the redness of the wound area and the pus discharge increase, start antibiotic medication, one 500 mg tablet of cefadroxil (7/E)

twice a day. Continue the local treatment of the wound and the antibiotic medication until the situation has subsided. Usually a 10-day antibiotic treatment is sufficient. In uncertain situations it may be advisable to consult a doctor via Radio Medical.

Lymphangitis (inflammation of lymph nodes and vessels) often originates from infected wounds. A visible symptom is a red, tender streak from the wound towards

the heart, caused by the swelling and inflammation of lymph vessels. When the infection reaches the lymph nodes, they become enlarged and tender. Lymphangitis is not life-threatening (it is not blood poisoning!) but it requires a course of antibiotics. Give the patient one 500 mg capsule of cefadroxil (7/E) twice a day for 10 days. Also take care of the local treatment of the wound that caused the infection.

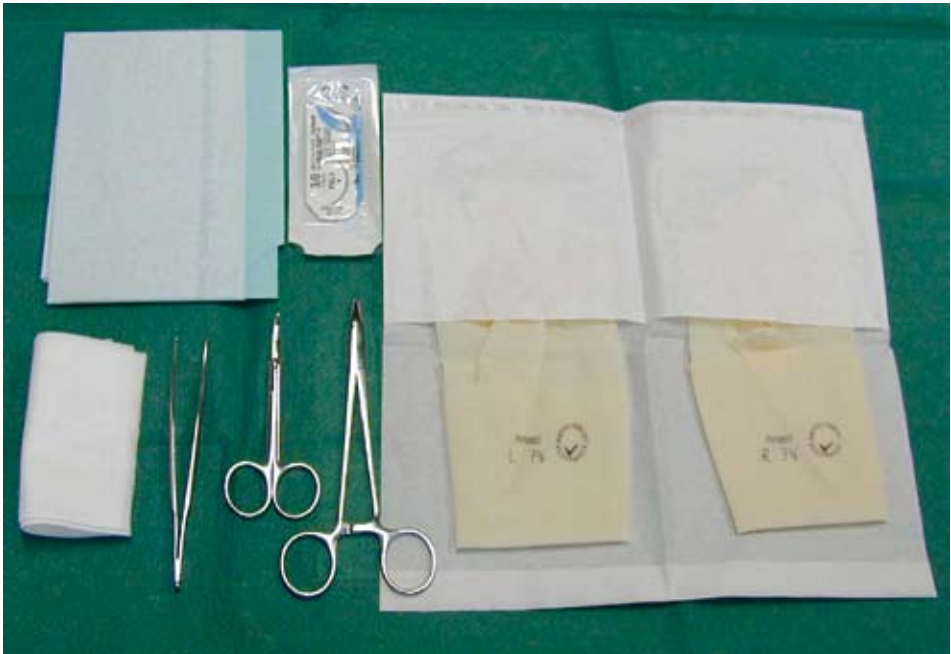


Figure 64. Suturing equipment



Figure 65. Anaesthetize both edges of the wound

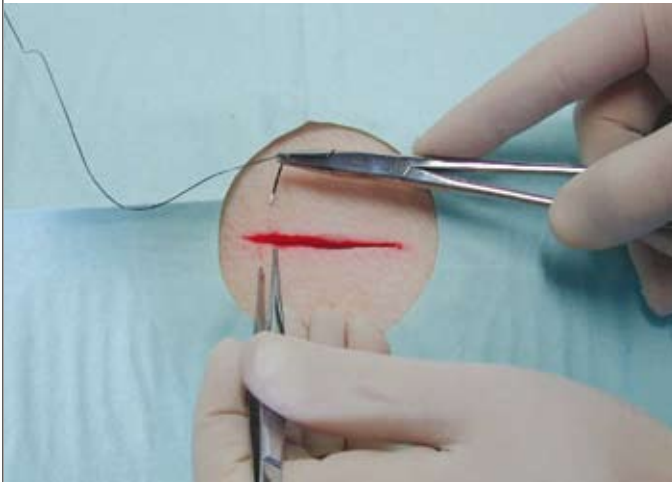


Figure 66. Push needle through the skin at a right angle

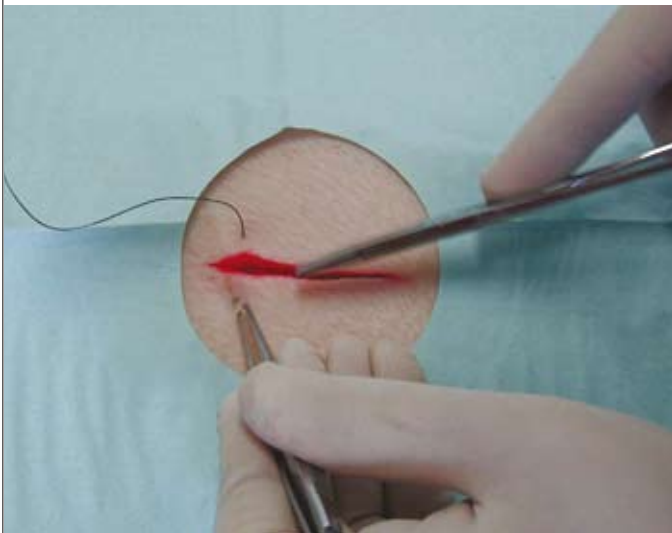


Figure 67. Pull needle through the other edge of the wound

Figures 68 and 69. Close a stitch with a reef knot

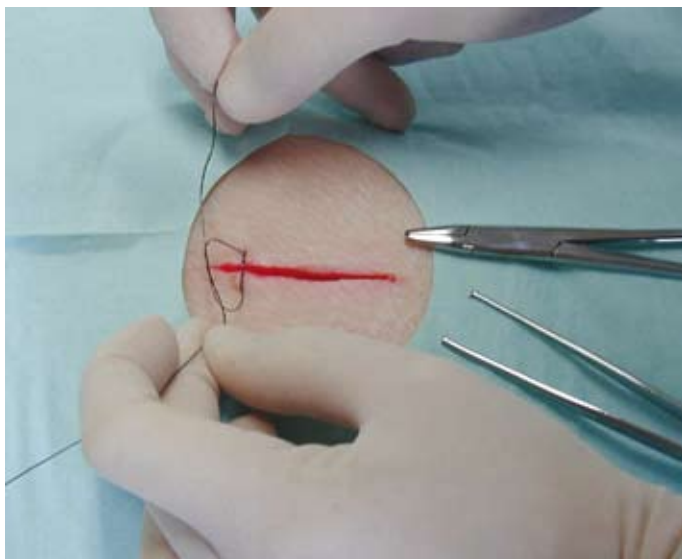
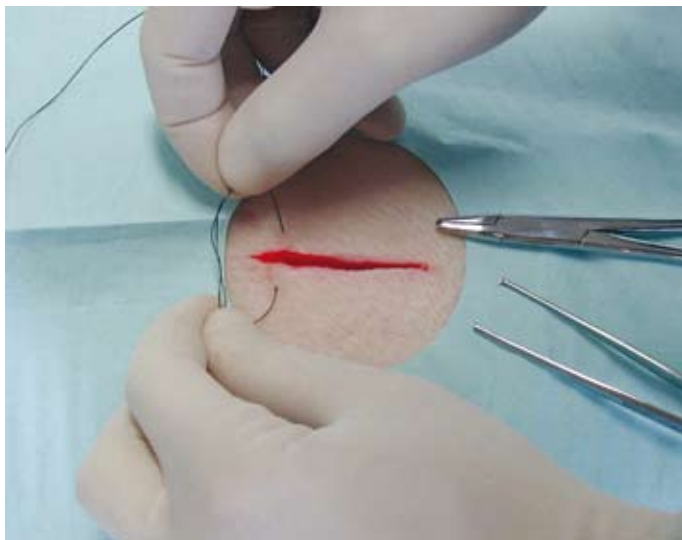


Figure 70. The number of stitches should be enough to keep the edges of the wound lightly together



48 Retention of urine and catheterization of urinary bladder

If the urinary bladder does not empty spontaneously, it has to be emptied by catheterization. In men, prostatic hypertrophy is the usual reason that prevents the bladder from being emptied. Women very rarely need catheterization. The urinary tract is vulnerable to infection, and therefore, absolute cleanliness is necessary in catheterization to reduce the risk. Before catheterization, a doctor should be consulted via Radio Medical about the necessity of the procedure.

- **Catheterization of urinary bladder needs to be performed carefully and with absolute cleanliness.**

The length of the male urethra is 15–20 cm from the bladder to the tip of the penis. The female urethra follows the front wall of the vagina and is much shorter, only about 4–6 cm. Female catheters are shorter than male catheters. Female urinary catheterization can also be performed using male catheters, but not vice versa.

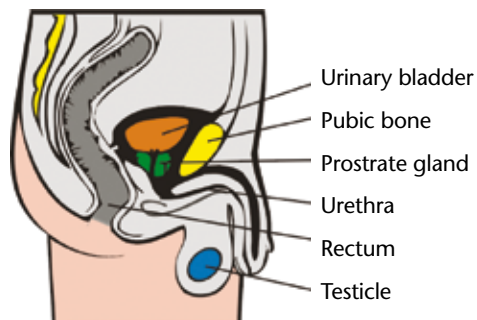


Figure 71. Anatomy of male urethra

1 Instruments needed for catheterization

The instruments needed for catheterization are:

- catheterization package
 - sterile gloves
 - kidney bowl
 - sponges
 - anatomic tweezers
- cleansing solution (0.5% chlorhexidine, 16/A)
- local anaesthetic gel (2% lidocaine, 13/B)
- catheter
- urinal.

2 Performing catheterization

Male urinary catheterization

Cover the patient's stomach and legs with a clean cloth leaving the penis clearly visible. Place the patient in a supine position with legs straight. Calm him and tell him that the procedure will be unpleasant.

Take hold of the penis with a sterile cloth and retract the foreskin to its maximal limit. Cleanse the opening of the urethra thoroughly using cleansing cream and sponges. Anaesthetize the urethra with local anaesthetic gel.

Use tweezers to hold the catheter about 5 cm from its tip. While lifting the penis upwards with your other hand, slowly and gently insert the catheter into the bladder through the urethra until urine flows into the tube (anatomy of male urethra, Figure 71). An assistant, if available, holds the other end of the catheter.

Let the urine drain into the urinal and measure the amount. The flow can be stimulated by gently pressing the stomach above the pubic bone. When the urine flow stops, remove the catheter.

Female urinary catheterization

The procedure for female urinary catheterization is the same as for the male catheterization. Place the patient in a supine, frog-legged position. Cover her stomach and legs with a clean cloth.

Spread the labia so that the opening of the urethra, situated above the vaginal orifice, can be clearly seen. Cleanse the opening of the urethra thoroughly with

cleansing cream and sponges. Cleansing is performed by wiping backward using a new sponge each time. Anaesthetize the opening of the urethra with local anaesthetic gel.

Use tweezers to hold the catheter about 5 cm from its tip. Slowly and gently pushing in the direction of the patient's chin, insert the catheter into the bladder through the urethra until urine flows into the tube.

Let the urine drain into the urinal and measure the amount. The flow can be stimulated by gently pressing the stomach above the pubic bone. When the urine flow stops, remove the catheter.

49 Positioning, moving, and evacuating a patient

In the case of accident and sudden illness, the aim is to prevent the patient's condition from worsening by positioning the patient correctly. A conscious patient can choose the most comfortable position him/herself. When unconscious, the patient needs to be positioned correctly to keep the respiratory tract open. The correct position depends on the condition of the patient (Table 8).

1 Supporting the patient's neck or legs before moving from the site of the accident

Supporting the neck

If there is even the slightest possibility that the patient has a cervical spine fracture, a neck support is put in place carefully without moving the head.

Supporting the legs

An injured limb can be supported in many ways. The idea is to prevent movement in the injured part or the whole limb. The support and bandages must not adversely affect the patient's overall condition. The support should be padded, and too tight bandages should be avoided.

An inflatable air splint is a quick and easy way to support a limb. Triangular bandages are very useful for supporting an upper limb. The arm rests on top of one triangular bandage, while the other bandage supports the arm against the chest. An arm sling is also a good first aid support for a shoulder dislocation as well as for fractures of the collarbone, shoulder and arm.

2 Moving a sick or injured person

If there is a possibility of imminent danger, such as fire, explosion, or poisoning, in the immediate vicinity, the patient needs to be moved immediately to a safe place. Anyone helping the patient also needs to consider his/her own safety, as there might be a risk of electric shock, poisoning, etc.

The patient is given first aid in safe surroundings. Only then are plans made for moving the patient to a place such as the ship's infirmary or sick bay for further treatment, or to land. The patient needs to be prepared for the transfer (e.g. the neck and limbs need to be supported), and the best route and means for the transfer are decided upon. The best way to move a patient depends on the patient's condition, the type of injury, and the route.

The patient must be monitored during the transfer to prevent his/her condition from worsening. Before moving the patient, his/her basic vital functions (i.e. breathing



Figure 72. The patient is well strapped into the stretcher when being moved

Table 8. Examples of recommended positions depending on the patient's condition

Patient's condition	Position
Unconscious, breathing	Always on the side to keep the respiratory tract open and to prevent the tongue from pressing against the pharynx
Chest injury	On the side, the injured side downward to prevent possible bleeding from the injured lung to the uninjured lung
Breathing difficulties or chest pain	Preferably half-sitting to keep the pressure as low as possible in the chest area, and to allow the patient to breathe easily
Abdominal pain	Usually a supine position or on the side with knees bent, abdominal muscles relaxed. Sometimes the patient prefers a sitting position
Sprain, fracture or bleeding in limb	Injured limb elevated to prevent swelling, bleeding and pain
Shock	A supine position with legs elevated to secure sufficient blood circulation and intake of oxygen to the basic vital organs, such as the heart and brain

and blood circulation) must be secured. The patient is kept warm using blankets.

If a stretcher is used for moving the patient, he/she must be strapped in so well that the injuries (e.g. fractures) are not made worse by the movement of the stretcher. The stretcher is carried horizontally. If this is not possible, the patient must be supported extra carefully to be moved vertically (Figure 72).

3 Evacuation

According to international law, if a sick or injured person needs to be evacuated to land for further treatment, it is the shipping company's responsibility to make sure that the patient gets proper treatment there.

Evacuation is performed according to the instructions of the shipping company. Practical implementation of the evacuation is negotiated and decided upon mainly with the coast guard or harbour authorities of the evacuation country.

If the shipping company has its own agent in the harbour of the evacuation country, he/she will help to organize the evacuation, to find a treatment facility, and to get the patient back to the home country. If the company does not have an agent of its own, it might have, for example, financial connections at the evacuation harbour. Therefore it is always worth asking advice from the shipping company.

The level of treatment varies markedly in different countries as well as within a country. The quality of treatment may vary greatly also in one treatment facility at different times. If the evacuation occurs outside the so-called developed countries, it may be difficult to find a facility with proper treatment services, where the sick or injured person could be safely left.

The national embassies, consulates, and honorary consulates can be consulted about choosing the treatment facility. If a national contact is not represented in the evacuation country, help can be asked

from the other consulates. The contact information of the national consulates can be obtained from the local telephone directory, hotels, or the evacuation authorities.

The Internet contains a lot of information about travel safety, passports and visas. There is also detailed information about the current situation and the level of health care of the countries. Especially the US pages are up-to-date, and offer a great deal of information (<http://travel.state.gov>).

The consulates offer advice and help in organizing the treatment, as well as other help. If necessary, they will also give help in contacting the shipping or insurance company, or the family of the injured person. However, they do not pay the hospital costs or any other expenses, e.g. the services of an interpreter.

Both domestic and foreign insurance companies annually publish various bulletins and lists of the different physicians and treatment facilities they have approved in the various countries. Insurance companies have a 24-hour telephone service. Many private emergency enterprises provide worldwide medical services and the patient's evacuation back to the home country.

● **Before evacuating a patient, contact one of the following to organize the evacuation and to choose a suitable treatment facility (Note: Instructions of the shipping company):**

- **harbour authorities**
- **coast guard**
- **shipping company agent**
- **national embassy or consulate**
- **insurance company.**

A report should accompany the evacuated patient. The report should include as accurate information as possible about the situ-

ation and the previous factors connected to the incident, as well as the treatment given on board. The patient should also have with him/her the contact information of the ship and the shipping company.

The ship's own shipping company should also be notified about the evacuation, so that it can begin the necessary procedures to ensure the quality of the treatment and to move the patient back to the home country.

● **Notify the shipping company about the evacuation, so that, if necessary, the patient's family can be notified as well, and the preparations for moving the patient back home can be started:**

- **time**
- **place**
- **personal information about the evacuated person**
- **reason for evacuation**
- **condition of the evacuated person**
- **means of evacuation.**

50 Cleaning hands and instruments

Whenever a nurse treats injuries and is exposed to the blood and excretions of patients, there is the possibility that he/she may be infected as well. The nurse or the instruments can easily pass on an infectious disease to other patients or vice versa.

1 Washing hands

It is important to wash your hands before treating a patient even when using sterile gloves. Wash your hands with plenty of soap and water. Rinse the soap well from your hands and dry with a clean towel. Rub chlorhexidine solution (16/A) on your hands and allow to dry. Finally protect your hands with sterile gloves.

After the treatment, take off your gloves and throw them into the rubbish bin. Excretion and blood on the gloves must not be touched with bare hands (risk of infection!). Finally wash your hands once again with soap and water.

2 Handling disposable instruments

The instruments used on board are kept in a sterile, covered container. Disposable instruments are kept in a dry, clean place, where their wrappings remain intact and dry. The sterilization date is marked on the wrapping. Once the wrapping is opened or damaged (e.g. gets wet), the instruments are no longer usable.

After being used, disposable instruments such as knives, hypodermic syringes and needles are placed in a separate, puncture-resistant, and covered container. The container should be clearly marked, indicating that its contents might be infectious. Ready-made yellow waste containers are available. A full waste container can be destroyed as agreed, either by the occupational health service or the pharmacy delivering medications to the ship.

3 Cleaning of instruments and disinfection

All non-disposable instruments such as scissors, needle holders and tweezers need to be rinsed with cold water first and then washed with warm water and soap (dish-washing liquid) using a brush until all the visible dirt is removed. Then sterilize the instruments by boiling them in water for 10 minutes. Lift them out of the water without touching them with the bare hands. Put the instruments into a covered steel container used for storing instruments. The instruments should always be clean and sterile so that they are ready to be used whenever needed.

Respiration masks and respiratory valves are washed in cool soapy water, after which they are dried. Then wipe the masks and valves with a cloth soaked in plenty of liquid disinfectant. After this, let them dry again and place them in the container, ready for use the next time.

For everyone's own safety, it is important to remember to use sterile gloves when cleaning instruments and work tables. If the instruments are kept unwrapped in a steel container, it is good to rinse them, for example, with liquid disinfectant just before use. In an emergency, strong alcoholic solution is also acceptable.

4 Handling contaminated dressings and textiles

Always wear sterile gloves when handling contaminated dressings and textiles. Place the textiles in a plastic bag and close it tightly. The manner of their disposal should be agreed upon with the occupational health service of the shipping company, because there is always a risk of infection with materials contaminated e.g. with excretions. There are special instructions for the disposal of contaminated materials. Taking off contaminated gloves should also be done with care.

5 Cleaning treatment tables and rooms

Treatment rooms need to be cleaned well after use, especially if there is blood or excretion on the treatment table or floor. Wash the excretion from treatment tables and dirty surfaces with soap and water, and then wipe the surfaces with a cloth soaked in plenty of liquid disinfectant. It is also possible to use chlorhexidine solution or, for example, 40–60% alcohol.

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SELF-PROTECT

V SELF-PROTECTION

51 Self-protection and prevention of infections

52 Vaccinations for seafarers

53 Death on board

51 Self-protection and prevention of infections

Infectious diseases are caused by bacteria, viruses, parasites and fungi, which may pass into the body along with water and foods, as well as by insects, touching, or air. Diseases can also spread from person to person because of poor food and hand hygiene. Sexual diseases are transmitted through blood or contact with secretions.

1 Avoiding the risk of infection when treating a patient on board

It should be borne in mind that blood and body fluids are always possible causes of infection (e.g. hepatitis and AIDS). Piercing the skin with a needle or knife that has come in contact, for example, with blood or secretions always poses a risk of infection.

- **Blood and body fluids are always possible sources of infection.**

When handling articles and clothes contaminated with body fluids or secretions, sterile gloves must be used, and it is also important to ensure that they do not cause a risk of infection for other people. Contaminated surfaces must be cleaned with a disinfectant.

If your own skin has come in contact with a patient's blood or secretions, it should be washed immediately with soap and water, after which it should be disinfected (e.g. by rubbing it with hand rub solution containing 40% ethanol). This is a precaution, because the patient's blood or secretions may always pose a risk of infection.

When treating a patient, sterile gloves must always be used. When giving mouth-to-mouth respiration, a disposable mask is used, if possible. (The mask can always be carried around, e.g. on a key chain.)

- **Always put on sterile gloves before touching the patient!**

If you think that you might be infected by a patient, you should notify, for example, the occupational health service of the shipping company. More detailed investigations will then be conducted to find out if there really is an infection. The occupational health service also takes care of the juridical issues (occupational accident reports, etc.).

Cleaning of instruments and surfaces

All used disposable instruments are placed in an undamaged, leak-proof container, and they are handled as hazardous waste. Non-disposable instruments are first washed thoroughly with soap and water and then disinfected for future use. Contaminated treatment rooms and surfaces need to be cleaned immediately after the treatment with liquid disinfectant containing chlorine (2% chloramine solution or 0.25% sodium hypochlorite solution) or phenol. Finally, all the surfaces must be wiped with 40% alcohol solution. Sterile gloves should be used all the time when cleaning. It is important to remember the risk of infection when handling used gloves.

2 Preventing the spreading of infectious diseases

It is often via the hands that infections are passed from one person or place to another. Taking good care of hand hygiene is the basic element in preventing infections from spreading. When washing is not possible, use alcoholic hand rub solution: rub the solution on your hands and let it dry.

- **Washing your hands is an effective way to avoid infectious diseases! Use alcoholic hand rub solution!**

Water and foods are the most common sources of infections. Avoid raw and undercooked foods. Peel or rinse fruit in clean water before eating.

Bottled **drinks** are safer than other drinks. The products of large international companies are well controlled and should be preferred. **Ice cubes** are often made from tap water, and should therefore be avoided.

Protect yourself against **mosquitoes and mites** with insect repellents and insecticides, and use clothes that cover you well. In the tropics, use a mosquito net in regions where malaria is prevalent.

All casual **sex contacts**, especially if unprotected (without a condom) pose a high risk of infection. In addition to actual sex diseases, e.g., hepatitis B is easily spread through sexual intercourse.

Swimming and wading in shallow water in tropical regions exposes to a variety of parasites and micro-organisms which may be difficult to get rid of later.

52 Vaccinations for seafarers

A seafarer's vaccinations need to be up-to-date. In some countries it is possible to get basic vaccinations free of charge at public health care centres. The vaccines for other than basic vaccinations can be purchased on prescription from a pharmacy, and taken to the person giving the vaccination.

A seafarer should consider well in advance which vaccinations to take and when to take them. Vaccinations should be taken in good time before going to sea, as they often have side effects. For instance, when leaving for less developed countries, it is recommended to take some extra vaccinations already in your home country instead of having to consult a local practitioner in some developing country. For example, infectious hepatitis and HIV/AIDS are often spread by infected needles.

One vaccination usually protects against one disease. The vaccine against hepatitis B, for instance, protects only against that and not against other infectious inflammations of the liver, which may be equally dangerous as hepatitis B. And there is no vaccine for HIV yet.

No vaccine guarantees 100% protection. Therefore, in addition to the vaccinations taken, it is important to behave sensibly and avoid infections.

The vaccination recommendations of the authors of this book are listed in Table 9. Yellow fever vaccine is the only one mandatory for entry to certain countries. Information on recommended vaccinations for travellers is published annually by the World Health Organisation (WHO).

Table 9. Recommended vaccinations for seafarers
(Vaccination against yellow fever is the only mandatory one)

Vaccine	Persons to be vaccinated	Need for booster vaccination
Tetanus	Every seafarer	Every 10 years
Diphtheria	Every seafarer	Every 10 years, given together with tetanus vaccine
Polio	Every seafarer	Every 5–10 years depending on the region visited
Yellow fever	Mandatory when travelling to Africa and South America	Every 10 years
Cholera	Persons staying in areas with poor food and water hygiene	Every 2 years
Typhus	Persons staying in areas with poor food and water hygiene	Every 1–3 years depending on the vaccination
Hepatitis A	Persons who a) travel and stay outside Europe, the USA and Canada b) maintain sanitation equipment on board	Every 10–20 years
Hepatitis B	Persons responsible for medical treatment on board, especially if there are Asians or Africans among the crew	No need for revaccinations

53 Death on board

An injured or sick person will be treated until death can be confirmed. Even if a patient cannot be saved, everything possible should be done to alleviate his/her last moments.

Death can be confirmed on the basis of the following signs:

- Pupils are permanently enlarged and do not react to light.
- Spontaneous breathing has stopped and cannot be restarted by giving resuscitation.
- There is no heartbeat and resuscitation has not been successful.

If the time of death is unknown, it can be estimated on the basis of the so-called secondary signs of death:

- Body temperature decreases by about one degree an hour at room temperature.
- Blotches (skin colour turning to bruise-like purple) appear on the body parts facing downward in less than half an hour from the moment of death (livor mortis). Within 6 hours of death the blotches can be removed completely by pressing.

- Rigor mortis, stiffness, first becomes evident in the jaw within 2–4 hours. It spreads down to the legs in 6–8 hours, and disappears in the same order within a couple of days.
- The first sign of putrefaction appears as a greenish colour on the lower abdomen within a couple of days.

When a patient dies, the time of death, as well as all the signs of death, are recorded. The signs include no breathing, no heartbeat, no blood pressure, size of pupils, no reaction to light, blotches and the possibility of removing them by pressing, and rigor mortis.

For later investigation of the cause of death, the following information is gath-

ered: If the person is found dead, when was the last time he/she was seen alive? Who was the last person to see him/her alive? Who found the deceased person? Are there any signs indicating the cause of death (e.g. violence or accident) on the body or at the scene?

If the deceased is found on board, the surroundings should be kept unchanged. If that is not possible, information about the events and the situation should be recorded in detail. If there are any abnormalities in the surroundings or the scene, the deceased and the surrounding area should be photographed.

The ship's captain informs the authorities about the death, and they give instructions on how to proceed.

VI ADVICE AND INSTRUCTIONS

54 Radio Medical

55 Confidentiality and seafarers' health care

54 Radio Medical

1 Radio Medical system

Medical treatment on board ship is supported by a system called Radio Medical. Nowadays, the term telemedicine would be more appropriate, because the system no longer uses traditional radio waves. The official Radio Medical services are based on international agreements and are free of charge for all ships. The satellite connections of medical problems are also free of charge. With the help of the telecommunications system, a doctor on land can be consulted any time, day or night, wherever the ship may be.

Radio Medical messages are always signed by the captain of the ship. Since the radio connections have improved, ships more often directly consult their own national doctors, the company's occupational health physician, a medical treatment centre in their home town, or some other already familiar treatment unit.

The benefits of a consultation depend to a great extent on how well the person seeking advice can describe the illness or accident to the doctor, as well as how well he/she can understand and carry out the instructions given by the doctor. In some situations, sending a picture via a communication network can make it easier to communicate and exchange information.

The problem of consulting through Radio Medical is often that the doctor giving advice does not know the working conditions on board the ship, nor what medical equipment might be available on board. The person seeking advice should therefore be ready to give information about these facts.

On board ship, the person taking care of the patient is, in practice, the eyes, ears and hands of the doctor on land. The doc-

tors, however, do not know the seafarers' level of medical readiness, and this makes it more difficult to give correct advice that is understandable and can be carried out optimally.

2 Treatment on board ship and consultation through Radio Medical

Telemedicine can never replace the treatment skills on board ship. It can only help and support the treatment!

● **Consultation through Radio Medical can never replace the ship's own treatment readiness. Keep your treatment skills up to date!**

The person responsible for treatment on board must always proceed in the following order:

- 1 Find out the general condition of the patient.
- 2 Give the patient immediate, vital first aid and treatment.
- 3 Keep record of the course of events, the condition of the patient and the treatment given.
- 4 Plan possible further treatment.

When personal skills are sufficient

- The patient is treated on board ship, or the treatment continues on board until the patient can be transported for further treatment on land.

When personal skills are not sufficient

- Contact a doctor on land.
- Describe the course of events.
- Describe the condition of the patient.
- Explain what treatment has been given.

- Ask for instructions for further treatment.
- Keep record of the instructions given by the doctor.
- Carry out the instructions given by the doctor.
- Record the treatment given.
- Monitor the patient's condition.
- Consult the doctor again if necessary.
- Call a doctor to the ship, for example, by helicopter.
- Evacuate the patient from the ship as soon as possible.
- always when there are respiratory problems or abnormal breathing
- fever has lasted for over 2–3 days
- the temperature from the armpit is over 39.5°C
- all cases of stomach or chest pain
- when administering medication which is marked “only on doctor's orders”
- fractures and larger bruises and cuts.

● **If you are at all unsure about what you should do, consult a doctor through Radio Medical!**

3 When is consultation via Radio Medical necessary?

The ships' modern communication equipment enables consulting a doctor through Radio Medical whether you are sailing in home waters or far away in foreign seas. A doctor should be consulted in all cases of illness or injury. Even when the person responsible for treatment on board ship believes that his/her knowledge and skills are sufficient, it is still often advisable to ask for a professional opinion (a so-called second opinion) to support his/her own decisions and actions.

Most minor complaints and injuries can be treated safely and rather well without consulting a doctor. However, always remember that even minor symptoms can sometimes be a sign of a more serious condition. Monitoring the patient's health and condition after initial treatment is always necessary.

It is impossible to give a complete list of situations when consulting a doctor is necessary. For example, in the following cases, consultation through Radio Medical should be at least seriously considered:

- all mental health disturbances
- all disturbances of consciousness
- always when heart rate and blood pressure are abnormal

4 Consulting Radio Medical in practice

The importance of the advice given by Radio Medical and the benefit gained from it depend above all on the fact that there is a person on board with basic knowledge of medicine. He/she must be able to describe the symptoms in detail, so that the doctor understands them correctly. Basic readiness and know-how must be available on the ship so that the doctor's advice and instructions can be carried out.

Clear messages

Even with modern equipment there is still considerable disturbance in radio communication today. It is therefore important that all the information given from the ship to the doctor and all the advice and instructions given by the doctor are heard and understood clearly and unambiguously.

When reporting medical information it must be remembered that the confidentiality of radio communication is often inadequate e.g. marine VHF (very high frequency) radio calls. Therefore, the name of the patient, identity code, or other personal information should not be mentioned without a compelling reason in a communication medium that can be monitored by outsiders.

Keeping exact records

When consulting through Radio Medical, pen and paper should always be at hand. The contents of the messages are carefully written down. It is easier to receive the messages if they can be recorded with, for example, a dictaphone. The received instructions can then be listened to afterwards, and the contents can be confirmed.

Good basic knowledge of the patient's initial condition makes consultation easier and faster. The patient does not have to be examined again in the middle of the call in order to answer the doctor's questions.

Carrying out the procedures and recording them

The treatment procedures that have been carried out are entered into the ship's treatment log.

Patient follow-up

The condition of the patient is always monitored even after the treatment. The follow-up helps to ensure that the patient's condition is stable or progressing favourably. The follow-up times are recorded on a follow-up form (date, time, patient's condition, such as temperature, pulse, blood pressure, etc.).

New consultation

If the condition of the patient does not improve as expected, or it takes a turn for the worse, a doctor is consulted again.

55 Confidentiality and seafarers' health care

The data security regulations concerning the confidentiality of seafarers' health care are in accordance with those of any other form of public health care. Seafaring regulations and guidelines might, however, complicate the already complex data security and confidentiality regulations.

1 Maritime employer's obligation to obtain information

The maritime employer must be aware of the seafarer's health and any potential changes in it. Without this information, the maritime employer will not be able to

carry out his/her statutory duties. Only a person appointed by the shipping company has access to medical records, no one else. All confidentiality regulations also apply to this person.

Seafarers need a special health certificate when a contract of employment is drawn up. This may include a comprehensive, detailed description of prior health, which is verified by the seafarer's signature. If an employee has failed to report an injury or illness when signing the contract of employment, the maritime employer may not be obligated to cover, for example, treatment costs.

- **Maritime employers may need access to medical records to fulfil their statutory obligations regarding seafarers' health care.**

2 Medical records and the captain of the ship

Regardless of the vessel type, the captain of the ship is always responsible for the medication and the treatment given on board. He is responsible for drug provisions and drug usage; he signs the Radio Medical messages and is, for example, in charge of calling for the medical helicopter. In the role of the ship's doctor, he has right of access to the crew's medical records. The captain is also the shipping company's (employer's) representative, so combining these roles might sometimes cause problems in interpretation.

- **Maritime safety may require that the captain of the ship receives information about seafarers' health.**

3 Disclosing medical records to outsiders

The captain, the ship's nurse or another crew member who is responsible for treatment on board cannot disclose any individual or family secrets acquired while performing professional duties. The obligation to maintain confidentiality also applies to the person appointed by the maritime employer to be responsible for health care on board.

- **Confidentiality regulations also apply to the captain of the ship.**

Either the patient's written consent or the statutory right to such medical records is required before confidential information can be disclosed to outsiders. In public health care, often an oral or otherwise implicit patient authorization is enough for the transferring of patient data.

VII STRUCTURE AND FUNCTIONS OF THE HUMAN BODY, EXAMINATION AND RECORDING THE INFORMATION

56 Structure and functions of the human body

57 Examining the patient

56 Structure and functions of the human body

Giving proper medical treatment and examining sick or injured persons appropriately requires basic knowledge of the location and functioning of the internal organs.

1 Musculoskeletal system

The musculoskeletal system consists of the bones and the joints that connect them, as well as the muscles (Figure 73). The bones of the extremities are so-called long bones; the skull and the bones of the chest and pelvis are so-called flat bones. Bones are surrounded by a tight bone membrane, under which lies the actual hard bone surface. The bone is living tissue, which self-repairs after an injury by forming new bone under the bone membrane. The bone marrow is softer and more porous than the surface bone. New blood cells are formed in the marrow.

Cartilage forms a sliding surface between the joints, which are surrounded by a tight capsule of fibrous tissue containing a small amount of synovial fluid. The muscles are responsible for movement. There are hundreds of muscles, and even a simple movement requires the simultaneous action of several muscles. Tendons join the muscles to the bone, enabling the movement of the joints.

There are mainly two opposite types of muscles in the extremities: extensors and flexors. These so-called striated voluntary muscles are used to move the body. The smooth muscles, on the other hand, form the walls of the intestines and veins, which the central nervous system and peripheral nerves control according to the needs of the body.

2 Circulatory system

The heart, arteries and veins form the circulatory system (Figure 74). The heart pumps blood to all organs through the arteries, and the blood returns to the heart through the veins.

The heart

The heart is basically a four-chamber automatic muscular pump (Figure 75). The heart of an adult is the size of the owner's fist, and weighs about 300–350 grams. The heart consists of two ventricles and two atria. The atria help the blood flow into the ventricles. The left ventricle pumps blood into the systemic circulation to nourish the body with oxygen and other nutrients. The right ventricle pumps blood into the pulmonary circulation, where the carbon dioxide in the blood is replaced by oxygen. The coronary arteries that branch from the base of the aorta (the main artery from the left ventricle) are responsible for the circulation of the heart (Figure 76). In coronary heart disease and cardiac infarction, these veins are obstructed and the heart is deprived of oxygen, causing chest pain. The resting heart rate is 60–70 beats/minute. The heart pumps about 70 ml of blood at each beat. The frequency of the heart rate, i.e. the pulse and volume of the heart increase when the oxygen demand and consumption increase during exercise. Atricular fibrillation refers to the atria contracting so rapidly that the contractions turn into fibrillation, ending the pumping activity of the atria. Ventricular fibrillation is the equivalent state in the ventricles. Due to the fact that the contraction of the ventricles is a vital part of the circulatory system, the blood flow ceases during ven-

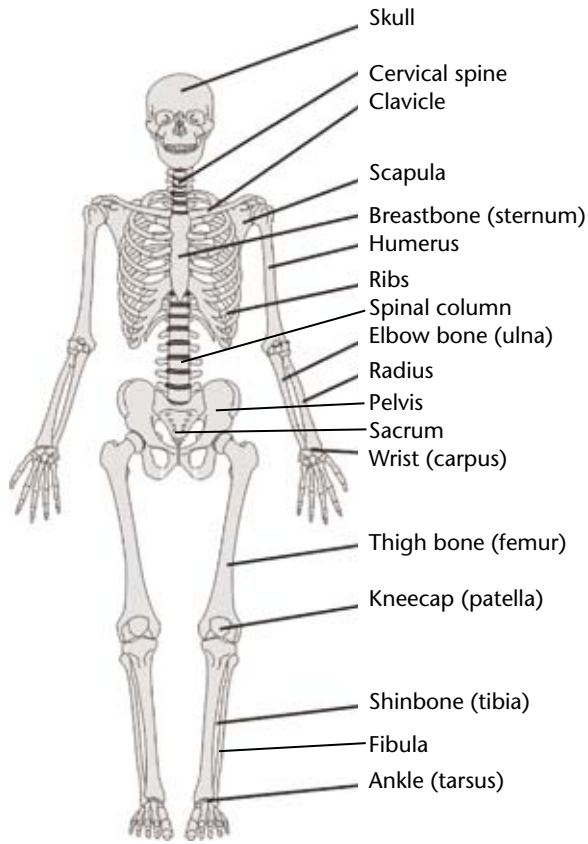


Figure 73. Human skeleton

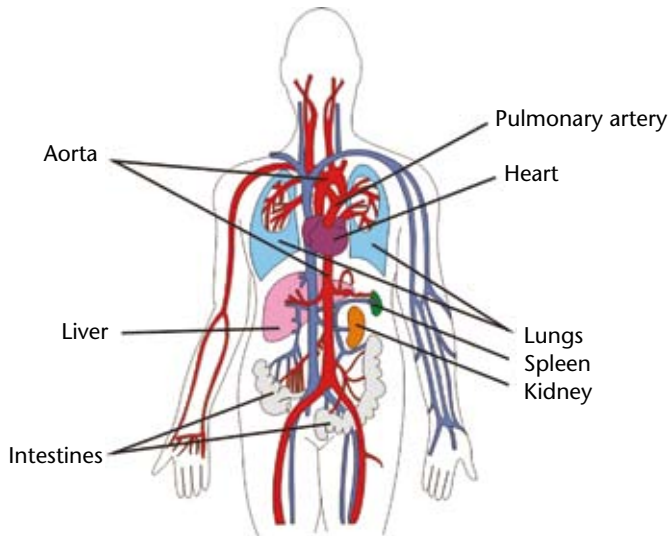


Figure 74. Circulatory system

tricular fibrillation, and the patient dies without effective resuscitation.

The arteries transport oxygen-rich blood to the tissues. The arteries, which originate from the aorta branch further into smaller arteries, and finally into very small vessels called capillaries. The passing of nutrients, oxygen and carbon dioxide from blood into the tissues, and vice versa, takes place in the capillaries. When the capillaries join together again, they form veins that transport the blood back to the heart. Blood pressure is caused by the flow

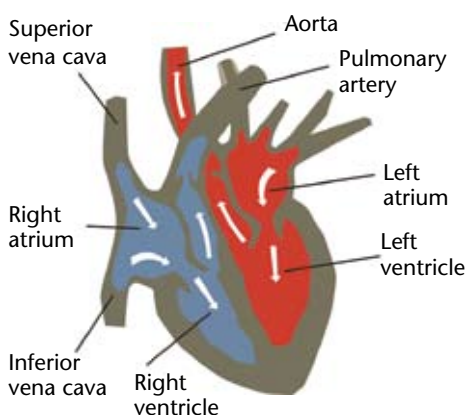


Figure 75. The heart

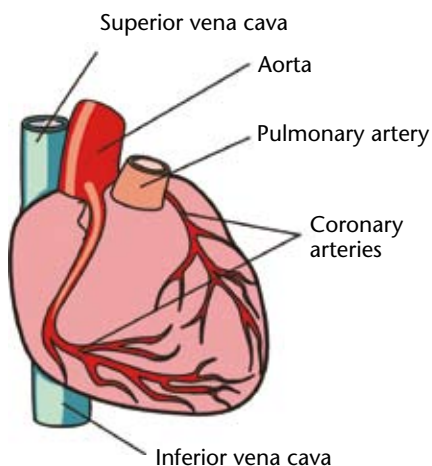


Figure 76. The heart and coronary arteries

resistance in the arteries. Systolic blood pressure refers to the pressure in the arterial system when the heart is contracting. Diastolic blood pressure, on the other hand, is the pressure in the arteries when the heart is at rest. An electrocardiograph is a device used to measure the electrical activity of the heart. Damage to the heart muscle after a cardiac infarction, for example, is displayed as an abnormality in the electrocardiogram (ECG).

Blood

The body of an adult contains about 5 litres of blood. It consists of plasma and blood cells: red blood cells, white blood cells and platelets. There are more red blood cells than any other types of blood cells. Blood cells are formed mainly in the bone marrow. The life span of white blood cells (except lymphocytes) and platelets is only a few days; the life span of red blood cells is a few months. Losing a large volume of blood, as a result of, e.g. haemorrhage, may cause circulatory shock.

Red blood cells contain haemoglobin. It is a protein which transports oxygen from the lungs to the tissues, and carbon dioxide from the tissues back to the lungs, from where it is removed by exhaling. Normally, there are 135–170 g/l of haemoglobin in the blood of men, and 115–160 g/l in the blood of women.

White blood cells help the body to resist bacterial and viral infections. They are formed in the bone marrow, but some of them mature and specialize in lymphatic tissue. The volume of white blood cells in blood normally increases during infections. Some white blood cells are capable of moving also in the tissues, and perform various functions. Thus, the pus at the site of a local infection is formed by white blood cells, the bacteria causing the infection and the damage in the tissue.

Platelets are the smallest type of blood cells and originate in bone marrow. They

have a central role in the clotting of blood and in stopping haemorrhage.

Plasma, the liquid part of the blood, contains large amounts of proteins which carry nutrients and hormones to the tissues. Plasma also contains antibodies and is involved in the clotting process.

3 Lymphatic tissue and the lymphatic system

Lymphatic tissue is part of the body's defence system and is found, for example, in the spleen and lymph nodes. There are lymphatic vessels in almost all organs of the body. They all lead to small groups of lymph nodes. These groups of lymph nodes are situated in the abdominal cavity, the thoracic cavity, under the chin, in the neck, in the crook of the arm, the groin, and in the armpits. The nodes become tender and swollen during local inflammations or infections, and they can then be felt by pressing with the fingers, for example, the nodes under the chin during pharyngitis.

4 Respiratory system

The respiratory system consists of the nose, pharynx, larynx, trachea, the bronchi and two lungs (Figure 77). Both lungs are surrounded by a smooth, double-layered pleural membrane (pleura). The outer layer is connected tightly to the wall of the thorax, while the inner layer is connected

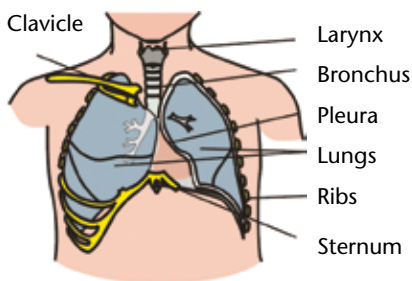


Figure 77. Respiratory system

to the lung. The space between these two layers is known as the pleural cavity which contains a small amount of fluid enabling the smooth sliding of the pleural membranes during the movement of the lungs. The negative pressure in the pleural cavity prevents the lungs from collapsing.

Breathing occurs mainly by movements of the diaphragm and the intercostal muscles. At rest, the respiration rate is 12–16 times per minute. About 500 ml of air is inspired or expired at a time. The rate, frequency and intensity of breathing increase during exertion, as well as during the course of various diseases.

After passing through the bronchi into the smaller bronchioles, the oxygen of the inhaled air reaches the alveoli where the gas exchange occurs. The oxygen is absorbed through the thin wall of the alveoli and is taken up by the red blood cells. The carbon dioxide in the blood, on the other hand, moves through the membrane into the alveoli and is removed from the body through expiration.

5 Digestive system

The digestive system consists of the gastrointestinal tract: the oesophagus, stomach, small intestine, large intestine, rectum and anus, as well as the teeth, tongue, salivary glands, liver and pancreas (Figure 78). The pancreas is situated behind the stomach. The intestinal canal is located mainly in the abdominal cavity, which is separated from the thoracic cavity by the diaphragm. It extends from the lower end of the stomach to the anus. The abdominal cavity is lined by the peritoneum, which partly covers the intestines and allows them to move rather freely in the abdominal cavity.

The digestive system breaks down the food into a suitable form for the body, absorbs and stores nutrients, and plays a role in removing the waste products from

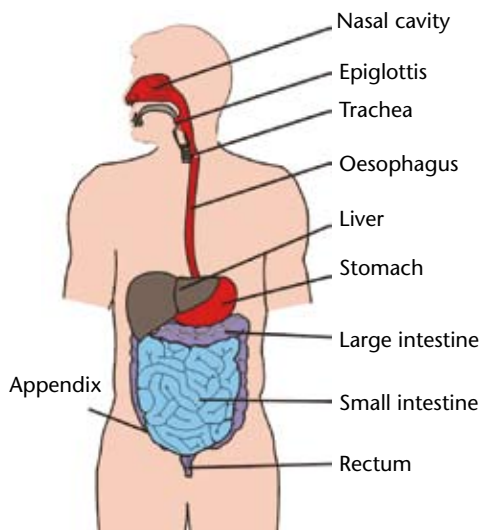


Figure 78. Digestive system

the body.

The gastrointestinal tract

The tongue moves the food to the teeth, which cut and grind it into smaller pieces. The enzymes in the saliva, secreted by the salivary glands, begin to break down the nutrients. The different tastes are distinguished by different receptors or taste buds on the tongue.

The oesophagus is a 25 cm long tube through which the food passes from the throat into the stomach. Its upper part is situated behind the trachea, and the lower part is located behind the heart, going through the diaphragm to the upper part of the stomach. The stomach is a J-shaped sack-like organ. It produces hydrochloric acid and enzymes to break down the food. The acidity of the stomach kills most of the microbes in the food. The food is then moved from the stomach into the small intestine in small amounts. The amount and quality of the food and the structure of the body affect the emptying of the stomach.

The adult small intestine is a tube which is about 3 metres long, and twisted into innumerable folds. It moves almost

constantly. It is situated mainly in the middle and lower parts of the abdominal cavity, and is attached to the back of the abdominal cavity with a part of the peritoneum called the mesentery. The walls of the small intestine are plicate and covered with villi, which increase the absorptive surface area manifold. The food is further processed in the small intestine, and absorbed into the lymphatic vessels and veins. The small intestine ends on the right side of the hypogastrium, where the large intestine begins. The large intestine is a tube that is over a metre long and is clearly thicker than the small intestine. It rises from the right side of the hypogastrium, turns left after the liver and continues down after the epigastrium. The last part of the large intestine is called the rectum. After passing through the small intestine, most of the liquid is removed from the food in the large intestine. The appendix, a less than 10 cm long atrophic part of the intestine, is situated at the beginning of the large intestine, to the right of the hypogastrium.

Pancreas and liver

The pancreas is an oblong gland situated behind the stomach, weighing about 100 grams. Pancreatic juice is secreted through the pancreatic duct to the midpart of the duodenum. The pancreatic juice neutralizes the acid and the liquified food that come from the stomach. It is rich in enzymes that break down the food into absorbable particles. The pancreas also produces insulin, which influences the blood sugar metabolism.

The liver is situated on the right side of the epigastrium, mostly protected by the ribs, the right lung and the diaphragm. It acts as a digestive gland and secretes bile into food. The veins of the digestive tract go through the liver, so the nutrients absorbed from the intestine first go through the liver and only then continue on their way to different parts

of the body. The liver also functions as a storage place for nutrients. Furthermore, the liver removes harmful substances from the blood circulation and excretes them together with bile into the intestine, through which they are then removed from the body together with the faeces. The bile produced by the liver is stored in the gall bladder, located under the liver at the end of the bile duct. During a meal, the gall bladder contracts and releases bile into the food matter. If a part of the bile crystallizes, it cannot be secreted via the bile ducts into the intestine. Instead, the precipitate blocks the bile ducts and initiates a painful bilious attack.

6 Urinary system

The urinary system consists of the kidneys, the ureters, the bladder and the urethra (Figure 79). The kidneys are situated at the back of the abdominal cavity under the diaphragm, on both sides of the spine above the waist. They are covered by a thin capsule and a fatty layer, which also attenuates blows.

The main function of the kidneys is to remove harmful substances from the blood and to excrete them out of the body

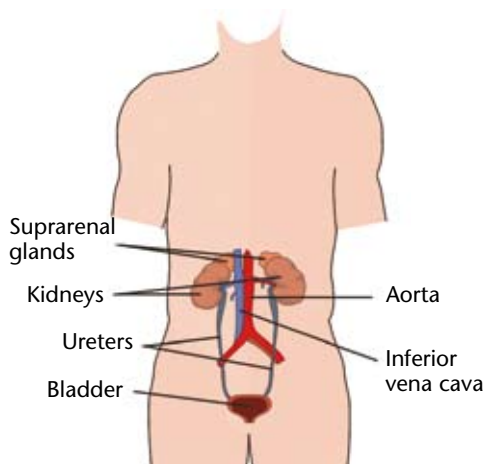
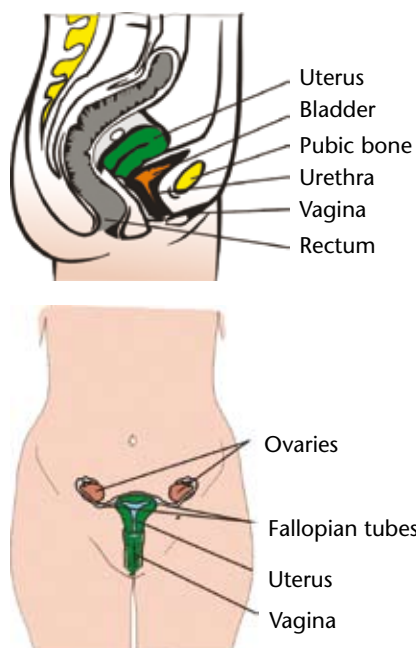


Figure 79. Urinary system

with the urine. About 1 500 litres of blood pass through the kidneys each day. About 1.5 litres of urine are produced daily, which means that normally more water is excreted from the body along with urine, than with perspiration, breathing and faeces combined. The urine flows from the kidneys through the renal pelvis and the ureters into the bladder. When the amount of urine in the bladder exceeds 300–400 ml, the urge to urinate begins. Emptying the bladder, i.e. urinating, takes place voluntarily by releasing the urethra sphincter. In women, when the pelvis muscles weaken as a result of ageing, for example, there may be some involuntary leakage of urine. In men, on the other hand, urinating may become more difficult with age when prostate enlargement makes the urethra narrower.

7 Reproductive system

The female reproductive system consists of two ovaries, the fallopian tubes, the uterus and the vagina (Figures 80 and 81). The ovaries produce the eggs, which travel through the fallopian tubes into the uterus. Between puberty and menopause, an egg is released from the ovaries once a month. If the egg is not fertilized, it is removed along with the surface layer of the endometrium of the uterus. If the egg is fertilized, it attaches to the endometrium in the uterus, where the developing foetus gets its nutrition. In this case, menstruation also stops. The uterus opens to the vagina through the cervix. Normally, there are fungal and bacterial organisms in the uterus to maintain its ability to resist infections. The female external genital organs consist of the labia major and the labia minor, between which is the opening of the vagina. Directly above it is the opening of the urethra.



Figures 80 and 81. Female reproductive system

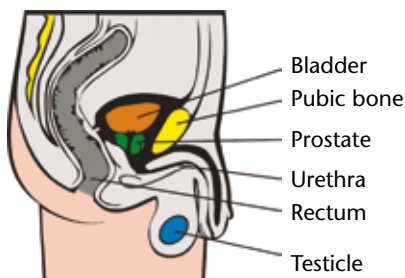


Figure 82. Male reproductive system

The male internal genitals consist of two testicles, two epididymides, the seminiferous tubules and the prostate (Figure 82). Sperm is produced in the testicles, from where, during ejaculation, it is transported via the epididymides, through the prostate into the urethra and out of the body. The semen largely consists of secretions from the prostate.

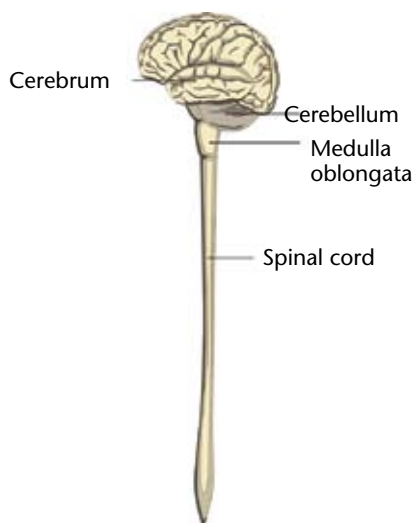


Figure 83. Nervous system

8 Nervous system

The nervous system consists of the central nervous system (CNS), i.e., the brain and the spinal cord, and the peripheral nerves that radiate from it (Figure 83). The brain is protected by the skull. It comprises the cerebrum, the cerebellum and the medulla oblongata. The brain is surrounded by meninges, between which there is a protective layer of cerebrospinal fluid. The same meninges protect the spinal cord.

The brain comprises a complex network of nerves, which control nearly all bodily functions and senses either directly or through neurotransmitters. The cerebrum, or the main part of the brain, is responsible for motor functions and thought processes. Each organ and sense has a corresponding area on the cortex, from where its functions are controlled.

The cerebellum takes part in coordinating movement and balance. The medulla oblongata is responsible for respiration. The spinal cord transmits nerve impulses from the body to the brain and vice versa. Reflexes are transmitted directly through the spinal cord and are therefore fast and involuntary.

The peripheral nerves consist of several parallel nerve cell branches. The nerves transmit information from different organs to the central nervous system and back. The sciatic nerve starts from the spinal cord and runs through the buttocks to the back of the thigh, all the way to the ankle. It is the longest nerve in the body. Irritation of the sciatic nerve causes radiating pain in the lower extremities.

9 The eye

The eye is a ball about 2.5 cm in diameter, surrounded by the white sclera. The transparent cornea is situated in the anterior part of the eye (Figure 84). The iris lies behind it. The pupil is a round opening in the iris that allows light to pass through it. Its size changes according to the amount of light present: the pupil contracts in the light and expands in the dark. The lens is situated behind the iris and becomes thicker or thinner depending on whether the person wants to focus on near or far objects. With age, the lens loses its elasticity, and the ability to focus on all distances decreases. In this case, eyesight can be improved by using glasses.

The area between the cornea, the iris and the pupil is called the anterior chamber, which is full of clear watery fluid. Behind the lens lies the vitreous chamber filled with a gelatinous substance, vitreous humour. Behind it, on top of the choroid layer, lies the retina, the photosensitive part of the eye. The sense cells react to light and

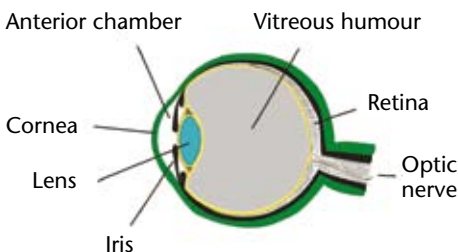


Figure 84. Anatomy of the eye

send an impulse through the optic nerve to the visual centre in the brain, where the visual sensation is formed.

The eyes are very cooperative. Efficiently functioning oblique muscles are needed to focus the eyes at the same point and to form a three-dimensional picture. Squinting and double vision are usually signs of poor cooperation between the oblique muscles. Possible causes include a serious illness or an injury.

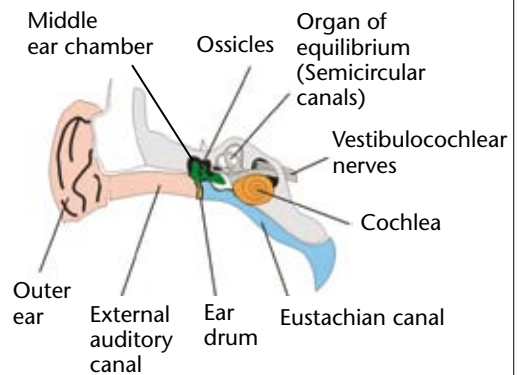


Figure 85. Anatomy of the ear

10 The ear

The outer ear consists of the external ear (auricle) and the external auditory canal (Figure 85). The external auditory canal secretes wax to protect the canal. It ends at the ear drum, which is skin-coloured, light-reflecting and bright when examined with an ear lamp. The sound entering the ear passes from the ear drum through to the ossicles in the middle ear and into the inner ear, where the sound waves cause the auditory nerve cells to vibrate. These cells transmit nerve impulses via the auditory nerve to the brain, where the sound is registered and interpreted. The middle ear is filled with air and is connected to the outside air by the eustachian canal, which opens into the nasopharynx.

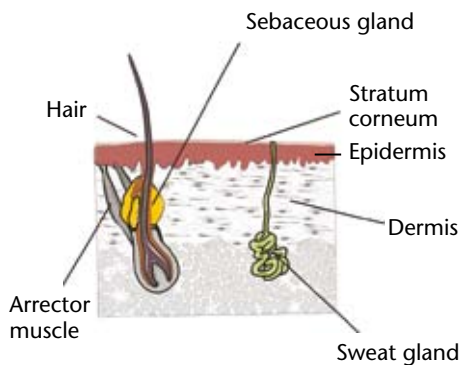


Figure 86. The skin

11 The skin

The skin is composed of two layers: the epidermis, or outer layer, which is covered by the cornified layer (stratum corneum), and dermis, or lower layer (Figure 86). The epidermis is renewed as the dermal tissue grows. The tactile nerve ends, the skin blood vessels, the sebaceous and sweat glands, as well as the roots of the hairs, or follicles, are found in the dermis. The thickness of the skin mostly depends on the thickness of the stratum corneum. The skin on the eyelids is less than 1 mm thick, while the skin on the soles of the feet can be several millimetres thick.

The skin covers and protects the body. Furthermore, the skin is involved in regulating the body temperature by adjusting the evaporation of heat via the

skin blood vessels and perspiration. The skin also plays a role in the body's immune defence system.

12 Endocrine system

The body's metabolism is mainly controlled by different hormones. The glands that produce them, the so-called endocrine glands, are the thyroid, parathyroid and suprarenal gland, the testicles and the ovaries. The thyroid gland, located in the neck below the 'Adam's apple', produces the hormone thyroxin, which maintains the body's metabolism. The parathyroid glands, which are connected to the thyroid gland, secrete the parathyroid hormone calcitonin to maintain the calcium balance. The suprarenal glands are above the kidneys. They produce so-called 'stress hormones', such as cortisone and adrenalin. The testicles and the ovaries produce the sex hormones.

The pituitary gland, which is located at the base of the brain behind the paranasal sinuses, controls the functions of the other endocrine glands, such as the thyroid gland, the testicles and the ovaries. On the other hand, it itself produces a part of the hormones, for example, growth hormone and the hormones affecting fluid balance. The brain also controls the functions of some organs that produce hormones.

57 Examining the patient

General principles

The examination can be divided into two parts: the patient's medical history and the actual examination. The former includes interviewing the patient and clarifying what has happened, the latter is the physical examination. Basic vital functions need to be investigated, and essential vital functions, breathing and blood circulation, must always be secured before further procedures.

Many diseases that are encountered on board are mild and easy to diagnose, and identifying them does not require extensive interviewing or examination. However, patients with a severe illness must be interviewed and examined thoroughly. Finding out what has happened helps to clear up how the injury originated, and often helps in assessing the type and severity of the injury. All examinations and procedures must be recorded on the examination form, which is then attached to the treatment log book on the ship (see Chapter 58 Patient information).

Follow-up of the patient's condition is crucial! Many severe illnesses can begin with mild symptoms, but the course of the illness can change rapidly. All changes and procedures must therefore be recorded. The treatment plan must be checked and modified when necessary. Exact records of the patient's condition and the procedures are also needed as a support when consulting a doctor through Radio Medical. Patient examination is covered in more detail in the sections of this book dealing with different illnesses and injuries. Diagrams of the particular organs can be used in the examinations and when recording information.

1 Medical history

The patient's medical history, anamnesis, is often the most important factor in determining the correct treatment. Inadequate or misleading preliminary information may lead to an incorrect assessment and treatment. The information may be ambiguous, in which case the person responsible must come to a conclusion on how to act. Collecting information from a severely ill patient can sometimes be difficult. In these cases, other staff members can help in giving information.

2 First symptoms

The appearance of the first symptoms (that is, the time when the patient first noticed symptoms related to the present illness) is assessed as accurately as possible, in days, or in sudden cases even in hours. This is done using units of time (e.g. days, hours), whereas vague definitions of time (e.g. a long time, some time) should be avoided. The situation in which the symptoms first appeared (e.g., when the patient was strained, resting or eating) should be clarified. Usually it is best to let the patient explain the situation first, and then ask specific questions.

Preliminary information needed:

- What is wrong, what happened?
- When did the patient start feeling ill – date, time?
- First symptoms – what, where, what kind?
- Has the patient suffered from similar symptoms in the past?
- Other symptoms/illnesses – what?
- Has the patient been treated in hospital – when, why, where, any operations?

- Do other persons on board have similar symptoms?
- Is the patient on medication – what, why, strength, dosage, when last taken?
- Alcohol – when last taken; is the patient intoxicated?
- Allergies to medication – to what; reactions to the medicine: rash, itching, anxiety, shock?
- Fever, shivering, fluctuating temperature – what is the patient's temperature?
- Self-treatment – how has the patient tried to treat the illness; medicine taken, other treatment?

Medical history can be charted further with the following questions:

- When and how did the symptoms begin?
- How have the symptoms changed, and what are they like now?
- How troublesome are the symptoms?
- At the moment, what bothers the patient most?

Often patients have already tried to treat the symptoms on their own. Therefore, it is necessary to ask what medication they have possibly taken. The medication needs to be considered as one of the possible causes of the symptoms (e.g., drug allergies). Patients should also be asked about alcohol consumption.

Pain is a common reason for seeking treatment. The site of the pain and possible use of pain-killers need to be clarified. Ask the patient about factors that make the pain worse or better, and about the type of pain: e.g., the pain is sharp or dull, continuous, fluctuating or altering in intensity. Also, any radiating pain should be inquired.

Some diseases can be ruled out by finding out about previous injuries and operations. If the patient has had an appendectomy, it is obvious that lower abdominal pain can not be caused by

appendicitis. Previous diseases might re-appear, and knowing about them helps to determine the appropriate treatment. Such diseases might be attacks of gallstones or kidney stones, for instance, as they are often similar to earlier episodes. These possibilities should be discussed with the patient. If there is a history of a disease, such as coronary disease or diabetes, these might worsen on board and cause symptoms.

If the patient is injured, it is important to investigate the mechanism of the injury and how much time has passed before seeking treatment. An injury in the abdominal area caused by a blunt instrument might not show symptoms for hours, during which shock can develop due to a leakage from a ruptured spleen or kidney. The strength of the cause of the injury should be determined. The height of a fall or the force of a blow can give some idea of how severe the damage is.

3 Specific questions about symptoms in organs

Answers to the above questions can usually help to confine the injury or illness to a specific organ system. The information and examination forms can be used to further clarify the patient's situation:

- Head: pain, dizziness, unilateral symptoms, recent injuries to the head, spasms
- Vision: loss of sight in one or both eyes, double vision, pain, redness in eyes, yellowness, discharge from eyes, watery or itching eyes
- Hearing: hearing loss, ringing in ears, earache or discharge from ears
- Mouth and throat: abnormally smelling breath, soreness, swelling, difficulties in speech or swallowing
- Neck: stiffness, enlarged lymph nodes, or other swelling

- Lungs: dyspnoea, coughing, secretion of phlegm, pain in chest
- Heart: chest pain and possible radiating pain, shortness of breath due to strain, swelling of feet
- Stomach: pain, changes in digestive functioning, vomiting, diarrhoea, yellowness of eyes or skin, black or bloody faeces
- Urinary organs and genitals: stinging or pain when urinating, lower abdominal or lower back pain, swelling in the groin, and possible lesions or discharge from the penis, normal or irregular menstruation, date of previous menstrual period, or possibility of pregnancy
- Skin: changes in the skin
- Endocrine glands: abnormal fatigue, thirst, or loss of weight
- Back and joints: pain and radiating pain, swelling, burning sensation or stiffness in joints.

4 Examining the patient

After a detailed interview, the site of the injury or the disease can often be determined. This area should then be examined and, if necessary, the examination can be expanded. If lung or heart disease is suspected, it might be necessary to examine the abdominal area as well.

A part of the examination can be carried out during the interview. The colour of the skin and sclera, presence of dyspnoea, and the psychological state of the patient can be assessed while talking.

When the patient complains about symptoms on one side of the body, this side is compared to the healthy side. If the right and left sides are different, this often indicates an abnormality, illness or injury. The differences are recorded. When suspecting an abnormality, the examiner can compare it to the same area in a healthy person, a co-worker, for example.

In the case of a non-invasive injury, due to a fall, for instance, if the injury can not be located, the patient's chest must be examined first, then the abdomen, pelvis, head, spinal column and limbs. The possibility of an injury to the cervical spine (neck) must be taken into account, particularly when examining or moving an unconscious, injured patient, as there is a risk of paralysis!

The basic equipment needed for the examination are: a sphygmomanometer for measuring blood pressure, a torch, stethoscope, thermometer and a watch. The more silent the examination room, the easier it is to examine the patient.

5 Vital functions

The vital functions of breathing and heartbeat must always be checked and secured before continuing with other examinations. A severely ill patient is interviewed quickly and briefly. If possible, additional information is gathered during the actual examination. Any external bleeding is stopped; pressing the wound with a hand is sufficient as first aid. In the limbs, a tourniquet should be used only in exceptional cases, such as amputation or severe crush injury. The final bandaging should not be done until the bleeding has been stopped.

● Before doing anything else:

1. Check to see if the patient is conscious, awake or can be waken up.
2. Make sure that the patient is breathing. If not, open the airways and start mouth-to-mouth respiration.
3. Feel the pulse. If there is no pulse, give resuscitation by pressing the chest.

6 Level of consciousness

The level of consciousness is assessed with the so-called Glasgow Coma Scale (Table 10). The principal scoring criteria are opening the eyes, ability to speak, and motion control. The scale clarifies the situation on the spot, and also when communicating with Radio Medical.

- **Consult a doctor through Radio Medical if the total score is 8 or less.**

7 Breathing

Determine whether or not the patient is breathing by observing the movements of the chest and listening to the patient's

breathing. Breathing can be assessed by placing one's own cheek or back of the hand in front of the patient's nose and mouth, by listening to the breathing in front of the nose, or by pressing an ear to the patient's chest.

Breathing frequency, shallowness and fragmentary breathing are assessed. The breathing frequency of an adult when at rest is 12–16 times per minute. Breathing is normally even and effortless and breathing frequency is stable. Breathing that becomes rapid is the first sign of a breathing problem. Breathing that slows down is a sign of a threatening apnoea. Problems of uttering even short sentences can indicate problems in breathing or painful breathing. If breathing problems have caused a lack of oxygen, the face begins

Table 10. Grading different responses according to the Glasgow Coma Scale

Opening the eyes	
• eyes are open or the patient opens them spontaneously	4
• eyes are opened on request	3
• eyes are opened when provoked with pain	2
• eyes are not opened when provoked with pain	1
Speech capability	
• answers questions matter-of-factly	5
• is confused, incoherent	4
• uses words out of context	3
• makes noises	2
• makes no noises even when provoked with pain	1
Motion control	
• moves all limbs by himself or on request	6
• pulls hand away when feeling pain, and uses other hand to help (localizes)	5
• pulls hand away when feeling pain, without helping with the other hand (dodges)	4
• bends both arms towards the head while rotating them inwards when provoked with pain (flexion)	3
• straightens both arms alongside the body while rotating them outwards when provoked with pain (extension)	2
• does not move when provoked with pain	1

Add together the highest points given in each area of the scale. The total score ranges from 3 to 15. A total score of 8 or less indicates a clear disturbance, and the patient must be monitored very closely.

to turn pale and ultimately blue. Blue-ness can best be seen on the lips. When listening with a stethoscope, the breathing sounds are quiet and sound similar from both lungs (Figure 87). Stronger breathing sounds, wheezing and rasping sounds are a sign of constriction caused by asthma, excretion of mucus, or inflammation. Any deviating breathing sounds, related to inhaling or exhaling, must be examined. The sounds should be similar on both sides of the chest; different sounds indicate an abnormality. For instance, an injured person might have a collapsed lung, making the breathing sounds quieter on that side than on the healthy side, or they may not be heard at all.

The smell of the patient's breath may reveal the problem. The smell of ethanol suggests the use of alcohol, while the smell of acetone might be caused by ketoacidosis associated with an abnormally high level of blood sugar.

8 Pulse

The pulse is felt with the fingertips. The thumb is not suitable for feeling the pulse because the examiner's own pulse might be confused with the patient's. The wrist artery is the primary place for feeling the pulse. If the blood pressure is low (below 80 mmHg), and the wrist pulse can not be felt, the pulse should be taken from the carotid artery on the neck.

In the lower limbs, the pulse can be felt from the groin, behind the knee, from the ankle behind the malleolus medialis or the metatarsus. The pulse in these areas should be checked especially in leg injuries.

The normal heart rate in adults is 50–100 beats per minute. There are many factors affecting the resting pulse, such as age, sex, physical condition, liquid balance, fever, nervousness, fear, pain and possible medication. In addition to the



Figure 87. Breathing sounds are checked on both sides

rate, the regularity of the pulse must also be considered. The heart rate can change according to the rate of breathing, but this is normal. An elevated pulse rate can be the first sign of severe bleeding or exacerbation of pain and breathing difficulties.

9 Blood pressure

The normal blood pressure in adults is 120–140 mmHg (systolic) / 70–85 mmHg (diastolic). Blood pressure is always taken twice, because it can change depending on the situation. If there is any doubt about the validity of the measurement, it should be taken again.

Blood pressure is usually measured with a sphygmomanometer, but it can also be roughly estimated without the instrument. If the wrist pulse can be felt, the systolic pressure is above 80 mmHg. If the wrist pulse can not be felt, but the neck pulse can still be felt, the systolic pressure is between 60 and 80 mmHg. There is a definite threat of shock if the systolic pressure is below 90 mmHg and the pulse over 120 beats per minute. Blood circulation in the myocardium and oxygen intake begins

to decrease if the systolic pressure falls below 90 mmHg. When the systolic pressure is below 70 mmHg, blood circulation in the brain begins to weaken.

● **The situation is always serious, when**

- **systolic blood pressure is below 90 mmHg, or**
- **diastolic blood pressure is above 130 mmHg.**

Consult a doctor via Radio Medical!

10 Skin temperature

Skin temperature is assessed at the same time as the pulse, and information is obtained about the state of the peripheral circulation. The skin of a feverish patient is usually exceptionally warm, because the body is trying to release excess heat through the skin. When injured or ill, the patient's body tries to protect the circulation and oxygen intake in vital organs like the heart and the brain by slowing down the circulation in the limbs, muscles and the skin. The skin thus turns pale and cold.

Especially when the patient is injured, it is very important to assess the state of his/her peripheral circulation. If the border between cold and warm skin in the upper limbs changes, this might indicate a decrease in the amount of circulating blood. As bleeding continues, the skin temperature border moves up toward the shoulder.

When assessing the temperature, it is important to take into account the temperature of the environment. If the patient is exposed to cold, the extremities will cool down even without bleeding. Alcohol expands the capillaries and thus increases peripheral circulation, so the skin might feel warm even if the patient is losing large amounts of blood.

11 Other examinations

The patient's examination is continued systematically, one body part after another, until the state of all basic vital functions has been clarified and their functioning secured.

12 Body temperature

A change in body temperature is usually a sign of a disturbance. A rising temperature can indicate inflammation or imminent heat stroke, and a falling temperature might be a sign of hypothermia. It is usually sufficient to measure the temperature from the armpit. In more severe cases, the temperature and the temperature borders of the limbs should also be measured. Any changes in temperature during follow-up should be recorded. Temperature changes may indicate an underlying illness (e.g. fluctuating temperature in malaria).

13 The skin

The skin of the face and some parts of the limbs is visible even without the patient undressing. Always check the patient's

- skin colour, especially yellowness
- skin temperature and moistness.

A rash needs to be examined more thoroughly; this usually requires the patient to undress. Redness, signs of scratching, spots, cysts, lesions and secretions from these are recorded. Assess whether the skin changes are restricted to the surface layer of the skin, or whether the skin has thickened at the site of the rash. Chart the location and extent of the rash.

14 The face

Skin changes, swelling, muscle functions (ability to make facial expressions), and loss of feeling on the face should be

noted. Visible injuries, lesions or bruises are recorded. Check possible asymmetry of facial movements (e.g. one side of the mouth does not move when speaking).

15 The eyes

The general appearance of the eyes is examined. Are they bloodshot, or is there discharge from the eyes? Check possible bleeding and eye movements. In addition, examine the following:

- **Colour of the sclera** (whites of the eyes). In particular, record any yellowness or redness of the conjunctiva. Is the redness caused by distended blood vessels or is the reddish area even?
- **Symmetry of the pupils and reaction to light.** Normally both pupils are the same size. If their size differs, note which is smaller and which larger. When light is directed to the eye, both pupils should contract simultaneously.
- **Possible damage to the cornea, especially penetration injuries.** A magnifying glass can be used as an aid. The condition and curvature of the eye are best observed when the light is directed diagonally.
- **State of the anterior chamber and clearness of the aqueous humour.** Normally aqueous humour is clear. If it is red or cloudy, and if light penetrates it as if in fog, the front part of the eye may be infected, or there may be bleeding in the anterior chamber due to an injury.
- **Eye movements.** Eye movements are examined if the patient complains of double vision or when assessing the severity of skull injuries. The patient follows the examiner's fingertip with his/her eyes to the left and right, up and down. The examiner observes the symmetry of eye movements and asks about possible double vision in different eye positions. Record all jerky movements.

- **Vision.** Eyesight is always checked separately in each eye, and the other eye is covered during the examination with a hand, for example. If eyesight has weakened, the patient can be asked to count the examiner's fingers and to tell from what distance this can no longer be done. Near vision can be assessed by asking the patient to read aloud texts with different-sized print.
- **Field of vision.** The extent of the field of vision can be examined by sitting opposite to the patient, about one meter away. With one eye covered, the patient is asked to focus the other eye on the examiner's eye on the same side. The examiner moves a finger from outside the field of vision and asks the patient to tell when the finger can be seen. Thus, the examiner can estimate the extent of the patient's field of vision by comparing it to his/her own.

16 The ears

After the patient's symptoms have been determined, the outer ears, external auditory canals and ear drums are examined with an ear lamp (Figure 88). The painful ear is compared to the healthy one. The following points need to be checked:

- **Outer ear.** Appearance, bruises, scrapes and swelling. Does the patient feel pain when the outer ear or ear lobe is moved?
- **External auditory canal.** Condition of the skin, possible accumulation of wax, and openness of the canal. Does the patient feel pain when the outside of the canal is pressed?
- **Secretion from the external auditory canal.** Bloody secretion can be caused by an injury to the skin of the auditory canal or to the eardrum. Bleeding from the canal after a severe skull injury might be the only sign of a skull fracture.



Figure 88. The state of the outer auditory canal and eardrum is examined with an ear lamp

- **Eardrums.** Is the eardrum visible and intact? Examine its light reflection and colour. A healthy eardrum is light in colour, reflects light, and is clear, whereas an infected eardrum is reddish. When a healthy person holds his nose and blows air into it, pressure should be felt in both ears. If pressure is not felt, the eustachian canal to the nasopharynx might be obstructed. A rustling sound indicates that there is a hole in the eardrum. Record any differences between the ears.
- **Hearing test.** Hearing can be tested, for instance, by checking whether the patient can hear a clock ticking.

17 The nose

In addition to symptoms (stiffness, sneezing), check the following:

- **Secretion from nose.** Clear, watery secretion or bloody or purulent secretion from one or both nostrils.
- **Shape of the nose.** Dislocation, swelling.
- **Changes in the skin.** Rash, bruises.
- **Face symptoms.** Possible tenderness on the cheekbones and forehead when pressed.

18 Mouth and pharynx, neck

Noting the smell of the patient's breath is important in examining the mouth and pharynx. The condition of the patient's teeth, tongue and pharynx is checked using a torch. The tongue can be pressed down with a spatula to get a better view of the pharynx. Assess the movements of the tongue and face muscles. Also consider:

- **Smell of the breath.** Smell of alcohol or acetone.
- **Condition of teeth and gums.** Caries or cavities, gum abscess, loose and broken teeth (injuries), bleeding from the gums.
- **Movement of the tongue.** If the tongue bends to one side when pushed out, this might indicate brain damage due to a blow to the head. Bite marks on the tongue might indicate an epileptic seizure.
- **Redness in the pharynx,** and possible coating, swelling of the tonsils, lesions and cysts.
- **Lymph nodes on the neck.** The lymph nodes are felt under the angle of the mandible on the neck.
- **Movement of the jaw.** Tenderness in the jaw joint.

19 The neck

The movability of the neck is assessed when suspecting meningitis or encephalitis.

Note! Be very careful when moving the neck of a patient who is unconscious or complains of neck pain, numbness or weakness in the limbs, because these symptoms may be caused by a cervical fracture. When the neck or head is moved, the fracture may worsen and cause pressure, damaging the spinal cord, and the patient might become paralysed.

20 The chest

When examining the chest, always check also the blood circulation by measuring blood pressure and checking the pulse. In addition, consider the following:

- **Cough.** Is the patient coughing? Is the cough dry or is mucus present, is there phlegm? Is the phlegm clear and thin, or thick and yellow? Is the phlegm bloody?
- **Breathing frequency.** Are the chest movements symmetrical when breathing? Is the breathing effortless or constricted? The patient's voice; is the patient too weak to speak?
- **Symmetrical breathing sounds.** Are there wheezing or rasping sounds when the patient breathes in and out? Listen to the lungs with a stethoscope or by pressing your ear to the chest. Listen to the lungs from the left and the right side, and compare the sounds. Record any differences between the sides.
- **Pressing the chest.** Note! Press the chest very gently at first, because pressing may be extremely painful when, for instance, a rib is broken.

- **Pressing the stomach.** When examining a patient with chest pain, always check the upper abdomen as well for tenderness when pressed. Record tender areas.

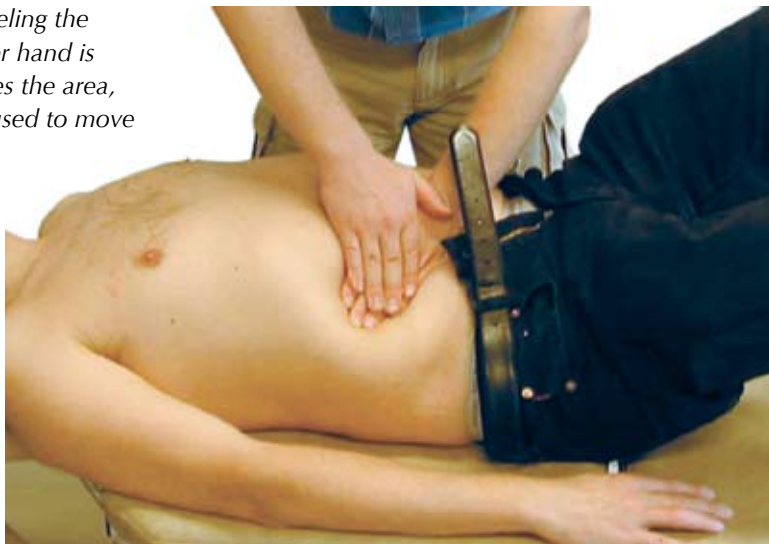
21 The abdomen

Examining a patient with stomach symptoms always includes checking the blood circulation and respiratory organs. Listen to the lungs and measure the pulse and blood pressure (see above). Pressing the stomach is essential. Testing the urine with a quick 'stix' test is often recommended. Women should be asked about the date of their last menstrual period and the possibility of pregnancy. Contraception methods may also be inquired, and whether a condom has been used throughout the intercourse.

Note the following:

- **Shape of the stomach.** Symmetry.
- **Scars from operations or due to other causes.** Stomach operations, injuries.
- **Tenseness of stomach muscles and tenderness.** Check possible radiating pain.

Figure 89. When feeling the abdomen, the lower hand is relaxed and palpates the area, the upper hand is used to move the lower hand



Press the abdomen area carefully with both hands (Figure 89). Keep the lower hand (the palpating hand) relaxed and press it with the upper hand (the pressing hand). Move the lower hand with the upper hand sideways and feel for any lumps or other irregularities.

- **Intestinal sounds.** Check sounds of intestinal functioning with a stethoscope. Usually growling can be heard due to movements in the intestines. Record any strong sounds, or total absence of sounds, and abnormal sounds.
- **Circumference of the abdomen.** Measuring the circumference of the abdomen and recording the changes will give an objective estimate of the changes in the patient's condition. Mark the place of measurement on the skin with a pen, so that follow-up measurements can be taken from the same place.
- **Distension in the rectum.** Rash, lesions.
- **Swelling.** Tenderness and lesions in the genital area.
- **The groin.** Are there distensions when standing up? Do they disappear when lying down? Enlarged or tender lymph nodes in the groin?

22 Upper and lower limbs and the back

When examining the back, the first step is to check whether there are visible abnormalities in the back, and then check the movements of the back. Find the sore areas by lightly tapping the back with a hand. Noting the sense of feeling in the limbs and the rectum is important to detect nerve entrapments (e.g., vertebral disc damage). Record the following from a patient with skeletal symptoms:

- **Walking.** Is the patient limping, is there asymmetry, is the patient able to walk on his/her toes and heels, does the

patient use aids, such as a cane, when walking?

- **Positions of the limbs.** Movements, shape of back, posture and mobility.
- **Swelling of the limbs.** Muscle hollows and lumps, asymmetry.
- **Skin of the limbs.** Temperature borders on the skin, colour of the skin, temperature of the lower limbs, asymmetry.
- **Movement and muscle strength.** Asymmetry.
- **Tenderness when pressed.** Tenderness in the limbs when pressed, tenderness in the back or spine.
- **Feeling the pulse in the artery.** Asymmetry.

23 Neurological and psychological status of the patient

Neurological symptoms may indicate a severe dysfunction or an injury. Therefore, identifying the deficiency symptoms is important in assessing the urgency of the need for care, and the severity of the condition.

Check the following:

- **Movement of the limbs and pain in them, moving around and problems with moving.** Is the patient able to walk straight without support and stand on toes and heels? Movements of the neck, bending.
- **Symmetry of facial expressions.** If the patient is not able to whistle normally or make a symmetric facial expression, this might be an indication of cranial nerve damage.
- **Eyes.** Symmetry of the pupils, reaction to light, eyesight, disturbances in vision, movements of the eyes, double vision.
- **Psychological state.** Logical speech and behaviour. If an abnormality is suspected, the patient can, for instance, be asked to list numbers by adding

7 each time to the previous number. When there is suspicion of a brain injury caused by an accident, the patient can also be asked about recent familiar events.

Psychological assessment is very limited on board, and usually requires extensive testing and long-term follow-up even on land. Mental illnesses and psychological symptoms can be clarified by checking the following:

- **Physical symptoms.** Dizziness, nausea, aches, perspiration, tremor.
- **Psychological symptoms.** Problems in sleeping, nightmares, depression, apathy, problems with memory, tiredness, exhaustion, anxiety and fear.
- **Changes in appearance and behaviour.** Changes in movements, speech, social interaction, mood and level of consciousness.

After the interview and the examination, try to find out whether the patient is suffering from obsessions, alienation from reality, hallucinations, hearing voices or seeing visions, disorientation or apathy, introversion, or is hyper-active or over-talkative.

24 Drawing conclusions

The main symptoms should be recorded during the interview. The examination forms (at the back of the book) for each organ will help in the examination and in recording information. The forms should be copied and filled out during the interview and attached to the log book on board. The decisions about further procedures are made according to the interview, symptoms and examination findings. If there is uncertainty regarding further procedures, consult a doctor through Radio Medical. Examination forms can also be faxed to the doctor, who will quickly be able to form an opinion about the patient's condition.

25 Follow-up, reassessment of the situation and checking the treatment

Even after a treatment protocol has been started, the patient's condition must be checked regularly. If the treatment is not helping as expected, or there are unexpected changes in the patient's condition, the need to stop or change the treatment must be reconsidered.

VIII FORMS

58 Patient information

- Preliminary information
- Basic vital functions
- Respiratory and cardiovascular diseases
- Musculoskeletal diseases and disorders
- Abdominal diseases and gynaecological ailments
- Conditions of ear, nose and throat
- Eye diseases, nervous system diseases, vertigo, headache
- Urinary and sexually transmitted diseases
- Psychological symptoms
- Skin diseases

59 Treatment on board

60 Patient follow-up form

The drugs mentioned in the book; concentrations, drug forms and treatment equipment

Index

58 Patient information

Preliminary information (to be filled out for each patient)

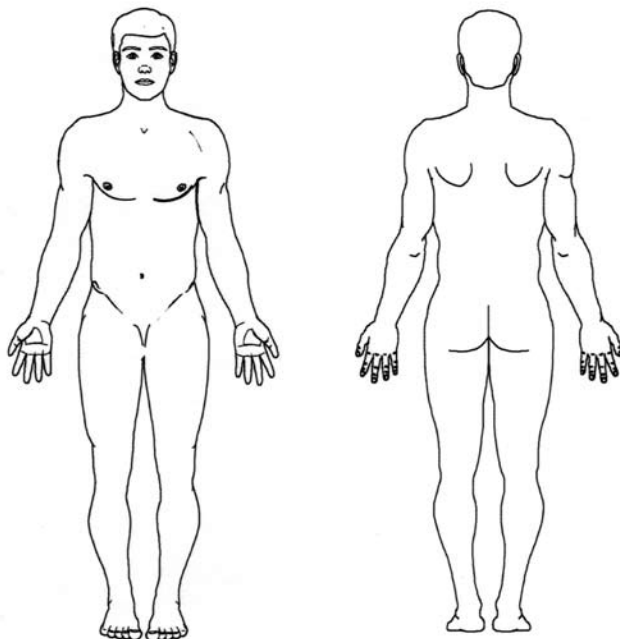
Date	Name of patient	Identity code
What is the ailment, what has happened		
When did it start and how have the symptoms developed (date, time, where, what kind)		
Fever, shivering, temperature fluctuation, measurements		
Self-care, own attempts to treat the ailment, medication, other treatment		
Similar symptoms previously, when		
Other symptoms or conditions, what		
Previous hospitalization, when, why, where, operations		
Medication, what, why, strength, dosage, last taken		
Drug allergy, what drugs, symptoms on using them: rash, itching, breathing difficulties		
Alcohol, time when last used, possible current intoxication		
Do any other people on board have similar symptoms		

Basic vital functions (to be filled out for each patient)

Date	Name of patient	Identity code	
CONSCIOUSNESS			
Verbal response (5–1 points) <ul style="list-style-type: none"> <input type="checkbox"/> oriented (5 pts) <input type="checkbox"/> confused (4 pts) <input type="checkbox"/> disconnected words (3 pts) <input type="checkbox"/> incomprehensible sounds (2 pts) <input type="checkbox"/> no response (1 pt) <p style="text-align: right;">_____ points</p>	Opens eyes (4–1 points) <ul style="list-style-type: none"> <input type="checkbox"/> spontaneously (4 pts) <input type="checkbox"/> on command (3 pts) <input type="checkbox"/> to pain (2 pts) <input type="checkbox"/> no response (1 pt) <p style="text-align: right;">_____ points</p>	Motor response (6–1 points) <ul style="list-style-type: none"> <input type="checkbox"/> obeys commands (6 pts) <input type="checkbox"/> localizes pain (5 pts) <input type="checkbox"/> withdraws from pain (4 pts) <input type="checkbox"/> abnormal flexion (3 pts) <input type="checkbox"/> abnormal extension (2 pts) <input type="checkbox"/> no response even to pain (1 pt) <p style="text-align: right;">_____ points</p>	Total level of consciousness Glasgow coma points total: _____ points (alarming, if 8 points or less)
RESPIRATION			
Respiration rate (rate x/min) <ul style="list-style-type: none"> <input type="checkbox"/> normal (10–20/min) <input type="checkbox"/> rapid, shallow (/min) <input type="checkbox"/> rapid, deep (/min) <input type="checkbox"/> intermittent <input type="checkbox"/> slowed (/min) 	Respiration sounds <ul style="list-style-type: none"> <input type="checkbox"/> normal, symmetrical <input type="checkbox"/> not audible <input type="checkbox"/> rasping inhalation <input type="checkbox"/> wheezing inhalation <input type="checkbox"/> rasping exhalation <input type="checkbox"/> wheezing exhalation <input type="checkbox"/> different sounds in right and left lung 	Breath smell <ul style="list-style-type: none"> <input type="checkbox"/> no odour <input type="checkbox"/> ethanol odour <input type="checkbox"/> acetone odour <input type="checkbox"/> other odour 	
BLOOD CIRCULATION			
Pulse (rate x/min) <ul style="list-style-type: none"> <input type="checkbox"/> undetectable <input type="checkbox"/> normal, regular (50–100/min) <input type="checkbox"/> rapid <input type="checkbox"/> slow <input type="checkbox"/> irregular <input type="checkbox"/> wrist pulse felt (blood pressure > 80 mmHg) <input type="checkbox"/> neck pulse felt (blood pressure > 60 mmHg) 		Blood pressure (/ mmHg) <ul style="list-style-type: none"> <input type="checkbox"/> normal (120–150 / 70–90) <input type="checkbox"/> high <input type="checkbox"/> low 	

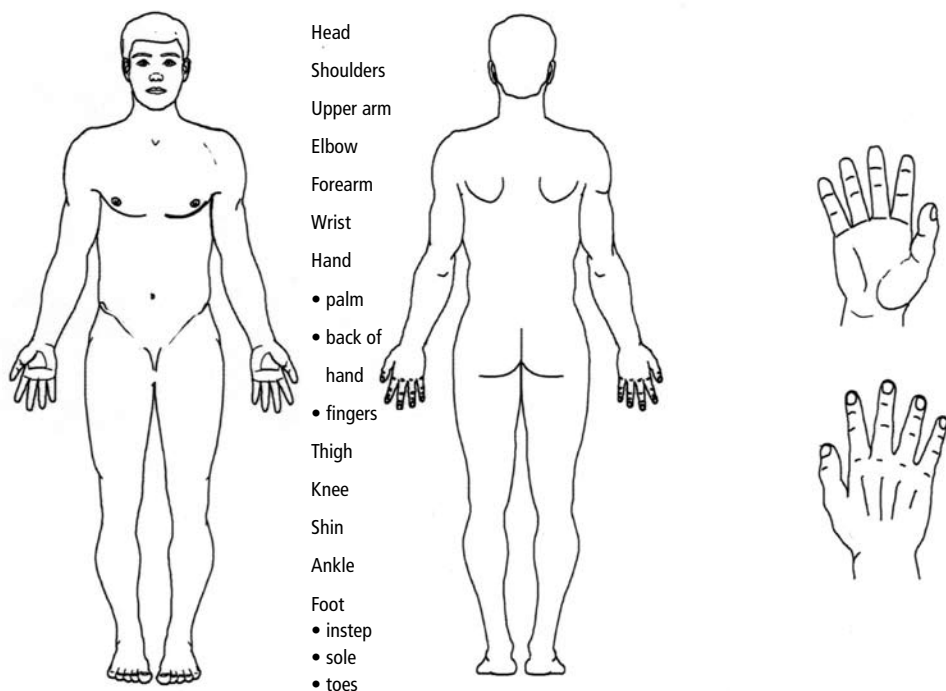
Respiratory and cardiovascular diseases (Specification of symptoms)

Date	Name of patient	Identity code	
SYMPTOMS (Always check the patient's preliminary information, see Preliminary information form)			
Pain <input type="checkbox"/> none <input type="checkbox"/> mild pain <input type="checkbox"/> strong pain, where? <input type="checkbox"/> radiating pain, where?	Shortness of breath <input type="checkbox"/> none <input type="checkbox"/> mild shortness of breath <input type="checkbox"/> severe shortness of breath	Breathing sounds <input type="checkbox"/> no abnormal sounds <input type="checkbox"/> rasping inhalation <input type="checkbox"/> wheezing inhalation <input type="checkbox"/> rasping exhalation <input type="checkbox"/> wheezing exhalation <input type="checkbox"/> different sounds in the left and right lung	
Coughing <input type="checkbox"/> none <input type="checkbox"/> coughing <input type="checkbox"/> excretion of phlegm <input type="checkbox"/> clear <input type="checkbox"/> coloured <input type="checkbox"/> blood in sputum	Speech <input type="checkbox"/> patient is able to form complete sentences without shortness of breath <input type="checkbox"/> patient is unable to speak	Nausea <input type="checkbox"/> no nausea <input type="checkbox"/> nausea <input type="checkbox"/> vomiting	
EXAMINATION (First check consciousness, respiration and blood circulation, see Basic vital functions form)			
Voice <input type="checkbox"/> normal <input type="checkbox"/> hoarse	Skin <input type="checkbox"/> normal <input type="checkbox"/> pale, with cold sweat <input type="checkbox"/> bluish <input type="checkbox"/> yellow <input type="checkbox"/> grey <input type="checkbox"/> flushed, reddish <input type="checkbox"/> signs of injury, what? <input type="checkbox"/> swelling in legs <input type="checkbox"/> equally in both legs <input type="checkbox"/> more in one leg	Chest <input type="checkbox"/> not tender when pressed <input type="checkbox"/> tenderness, where? Stomach <input type="checkbox"/> not tender when pressed <input type="checkbox"/> tenderness, where?	Temperature (°C) <input type="checkbox"/> normal (36–37.5°C) <input type="checkbox"/> fluctuating
If necessary, mark the location of symptoms and ailments on the pictures below			



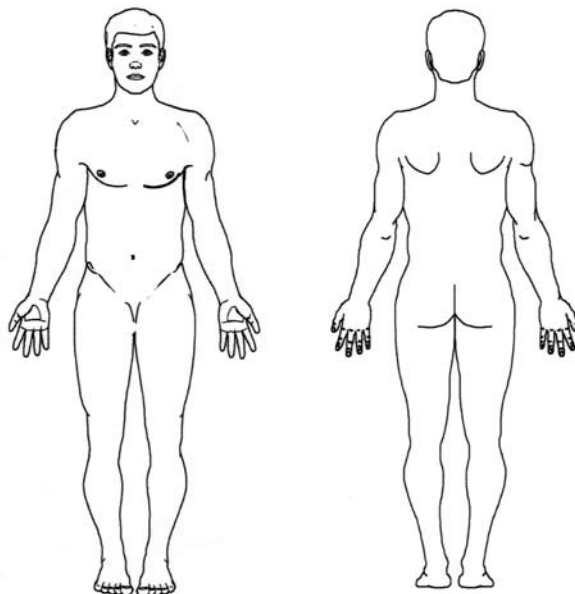
Musculoskeletal diseases and disorders (Specification of symptoms)

Date		Name of patient		Identity code	
SYMPTOMS (Always check patient's preliminary information, see Preliminary information form)					
Pain and swelling		Worsens the pain		Patient is capable of	
<input type="checkbox"/> painless <input type="checkbox"/> morning stiffness <input type="checkbox"/> constant pain <input type="checkbox"/> radiating pain, where? <input type="checkbox"/> tender varicose veins <input type="checkbox"/> swelling in legs <input type="checkbox"/> tender calves		<input type="checkbox"/> touching, pressing <input type="checkbox"/> cold, draft, humidity <input type="checkbox"/> warmth, sauna <input type="checkbox"/> movement, which?		<input type="checkbox"/> normal walking <input type="checkbox"/> walking on toes and heels <input type="checkbox"/> straightening knees <input type="checkbox"/> squatting down and getting up without support <input type="checkbox"/> bending the back forward and to the sides <input type="checkbox"/> making a fist and opening it <input type="checkbox"/> bending and straightening arms <input type="checkbox"/> raising arms above shoulders	
EXAMINATION (First check consciousness, respiration and blood circulation, see Basic vital functions form)					
General check-up		Skin and sense of touch		Examination of joints	
<input type="checkbox"/> posture and walking normal <input type="checkbox"/> unable to walk on toes <input type="checkbox"/> unable to walk on heels <input type="checkbox"/> needs walking aid <input type="checkbox"/> abnormal posture <input type="checkbox"/> limbs unequal in length		<input type="checkbox"/> skin intact and healthy <input type="checkbox"/> cut/abrasion <input type="checkbox"/> blood effusions <input type="checkbox"/> bruises <input type="checkbox"/> sense of touch normal <input type="checkbox"/> sense of touch reduced <input type="checkbox"/> loss of feeling and numbness in anal region		<input type="checkbox"/> nothing specific <input type="checkbox"/> tenderness when pressed <input type="checkbox"/> swelling of joint <input type="checkbox"/> redness of joint <input type="checkbox"/> warmth of joint <input type="checkbox"/> limited movement of joint <input type="checkbox"/> joint in abnormal position Swelling in leg <input type="checkbox"/> no swelling <input type="checkbox"/> equal swelling in both legs <input type="checkbox"/> unequal swelling in legs	
				Muscular injury	
				<input type="checkbox"/> swelling <input type="checkbox"/> bump in muscle <input type="checkbox"/> node in muscle Fracture <input type="checkbox"/> abnormal position of joint or bone of limb <input type="checkbox"/> swelling <input type="checkbox"/> tenderness when pressed	
If necessary, mark the location of symptoms and ailments on the figure below					



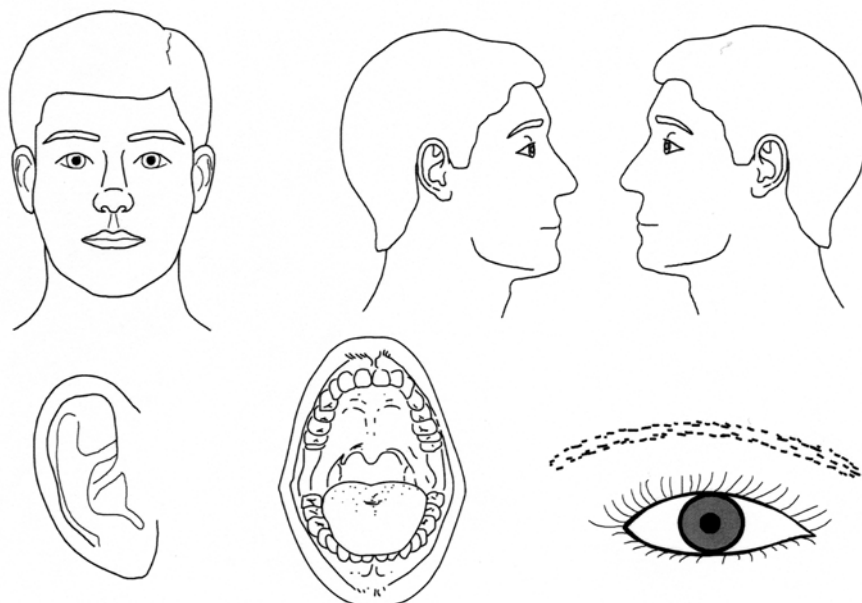
Abdominal diseases and gynaecological ailments (Specification of symptoms)

Date		Name of patient		Identity code	
SYMPTOMS (Always check patient's preliminary information, see Preliminary information form)					
Pain <input type="checkbox"/> painless <input type="checkbox"/> mild pain <input type="checkbox"/> strong pain <input type="checkbox"/> steady pain <input type="checkbox"/> wavelike pain <input type="checkbox"/> location of pain <input type="checkbox"/> radiating pain (where to?) <input type="checkbox"/> what relieves or aggravates the pain?		Functioning of digestive system <input type="checkbox"/> normal <input type="checkbox"/> sour belches <input type="checkbox"/> vomiting <input type="checkbox"/> bloody vomit <input type="checkbox"/> constipation <input type="checkbox"/> diarrhoea <input type="checkbox"/> blood in stool <input type="checkbox"/> black stool <input type="checkbox"/> bright red blood in stool		Urinary symptoms <input type="checkbox"/> no symptoms <input type="checkbox"/> frequent need to urinate <input type="checkbox"/> stinging when urinating <input type="checkbox"/> urinary retention	
		Vaginal discharge <input type="checkbox"/> no discharge <input type="checkbox"/> bloody discharge <input type="checkbox"/> white discharge <input type="checkbox"/> pus discharge <input type="checkbox"/> odourless discharge <input type="checkbox"/> smelly discharge		Menstruation, pregnancy <input type="checkbox"/> normal menstruation <input type="checkbox"/> date of last menstruation <input type="checkbox"/> contraception (what kind?) <input type="checkbox"/> possible pregnancy <input type="checkbox"/> pregnant (how many weeks?)	
EXAMINATION (First check consciousness, respiration and blood circulation, see Basic vital functions form)					
Pressing the abdomen <input type="checkbox"/> no pressure tenderness <input type="checkbox"/> abdominal tenderness (where?) <input type="checkbox"/> soft abdominal wall <input type="checkbox"/> boardlike tense abdominal wall		Pain <input type="checkbox"/> no pain when abdomen pressed <input type="checkbox"/> pain increases when abdomen pressed <input type="checkbox"/> tenderness in the back on percussion		Lumps <input type="checkbox"/> no lumps <input type="checkbox"/> lump in the abdomen <input type="checkbox"/> lumps in the flexure of the groin <input type="checkbox"/> lump in the groin, goes away when lying down	
				Intestinal sounds <input type="checkbox"/> normal <input type="checkbox"/> increased <input type="checkbox"/> absent	
Body temperature (degrees) <input type="checkbox"/> normal (36–37.5°C) <input type="checkbox"/> fluctuating			Urine tests <input type="checkbox"/> nothing specific <input type="checkbox"/> protein in urine <input type="checkbox"/> glucose in urine <input type="checkbox"/> blood in urine <input type="checkbox"/> inflammatory cells in urine		
If necessary, mark the location of symptoms and ailments on the figure below					



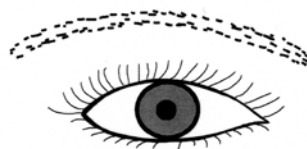
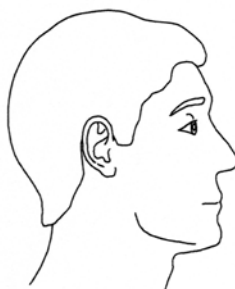
Conditions of ear, nose and throat (Specification of symptoms)

Date		Name of patient		Identity code		
SYMPTOMS (Always check patient's preliminary information, see Preliminary information form)						
Ear symptoms <input type="checkbox"/> none <input type="checkbox"/> ache <input type="checkbox"/> irritation <input type="checkbox"/> blocked feeling <input type="checkbox"/> pain on moving ear		Nasal symptoms <input type="checkbox"/> none <input type="checkbox"/> stuffiness <input type="checkbox"/> sneezing <input type="checkbox"/> clear watery discharge <input type="checkbox"/> thick, coloured discharge <input type="checkbox"/> nosebleed		Facial symptoms <input type="checkbox"/> none <input type="checkbox"/> tenderness, feeling of pressure on forehead <input type="checkbox"/> tenderness, feeling of pressure below eyes <input type="checkbox"/> tenderness elsewhere, where?		Mouth and throat symptoms <input type="checkbox"/> none <input type="checkbox"/> pain when swallowing <input type="checkbox"/> swallowing difficulties <input type="checkbox"/> breathing difficulties <input type="checkbox"/> feeling of lump in throat <input type="checkbox"/> tenderness when moving jaw
EXAMINATION (First check consciousness, respiration and blood circulation, see Basic vital functions form)						
Ear canal <input type="checkbox"/> nothing specific <input type="checkbox"/> pain when flap in front of ear hole is pressed <input type="checkbox"/> ear wax <input type="checkbox"/> discharge from ear passage		Eardrum <input type="checkbox"/> not visible <input type="checkbox"/> light, clear <input type="checkbox"/> reddish, dull <input type="checkbox"/> hole in eardrum <input type="checkbox"/> 'nose blow' felt in ear <input type="checkbox"/> 'nose blow' hisses in ear		Nose <input type="checkbox"/> nothing specific <input type="checkbox"/> clear watery discharge <input type="checkbox"/> thick, yellow discharge <input type="checkbox"/> nosebleed		Mouth and throat <input type="checkbox"/> nothing specific <input type="checkbox"/> reddish <input type="checkbox"/> swollen <input type="checkbox"/> coated (mouth/ throat) <input type="checkbox"/> blisters <input type="checkbox"/> wound <input type="checkbox"/> cavities in teeth <input type="checkbox"/> bleeding gums
Neck <input type="checkbox"/> nothing specific or abnormal <input type="checkbox"/> non-tender lumps in neck <input type="checkbox"/> tender lumps in neck, diameter:			Body temperature (°C) <input type="checkbox"/> normal (36–37.5°C) <input type="checkbox"/> fluctuating			
If necessary, mark the location of symptoms and ailments on the pictures below						



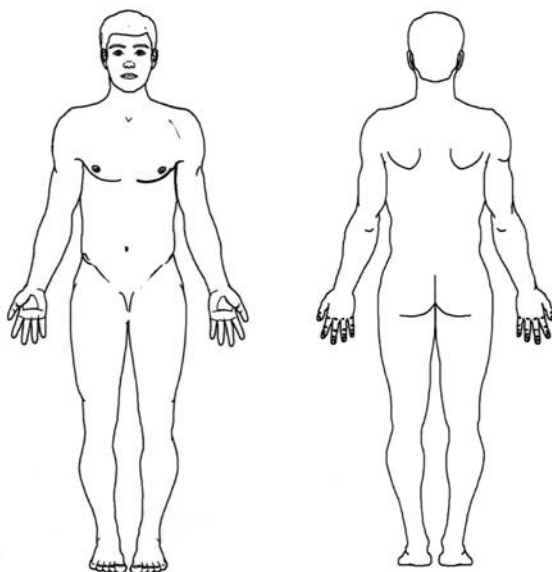
Eye diseases, nervous system diseases, vertigo, headache (Specification of symptoms)

Date		Name of patient		Identity code	
SYMPTOMS (Always check patient's preliminary information, see Preliminary information form)					
Eyes <input type="checkbox"/> nothing specific <input type="checkbox"/> pain <input type="checkbox"/> burning <input type="checkbox"/> itching <input type="checkbox"/> discharge <input type="checkbox"/> sensitive to light <input type="checkbox"/> pain when moving eyes <input type="checkbox"/> blurred vision <input type="checkbox"/> double vision		Nervous system, vertigo, sense of touch <input type="checkbox"/> nothing special <input type="checkbox"/> rotation vertigo <input type="checkbox"/> positional vertigo <input type="checkbox"/> nausea, vomiting <input type="checkbox"/> stinging sensation in limbs <input type="checkbox"/> numbness of skin <input type="checkbox"/> weakness or stiffness of limbs <input type="checkbox"/> cramps		Headache <input type="checkbox"/> no headache <input type="checkbox"/> pain in neck or back of head <input type="checkbox"/> unilateral pain <input type="checkbox"/> pressing pain <input type="checkbox"/> stabbing pain <input type="checkbox"/> stiff neck	
EXAMINATION (First check consciousness, respiration and blood circulation, see Basic vital functions form)					
Conjunctiva <input type="checkbox"/> no redness <input type="checkbox"/> bloodshot <input type="checkbox"/> redness	Eye movement <input type="checkbox"/> normal, patient able to follow object, no double vision <input type="checkbox"/> twitching <input type="checkbox"/> double vision	Pupils <input type="checkbox"/> contract in light <input type="checkbox"/> small <input type="checkbox"/> large <input type="checkbox"/> no contraction in light <input type="checkbox"/> unequal in size, which one is larger? <input type="checkbox"/> blood in anterior chamber		Nervous system <input type="checkbox"/> nothing specific <input type="checkbox"/> unable to whistle <input type="checkbox"/> stiff neck <input type="checkbox"/> neck and shoulder muscles feel hard <input type="checkbox"/> unable to walk on toes <input type="checkbox"/> unable to walk on heels <input type="checkbox"/> reduced sense of touch in cheeks <input type="checkbox"/> reduced sense of touch in limbs <input type="checkbox"/> numbness in anal region	
If necessary, mark the location of symptoms and ailments on the pictures below					



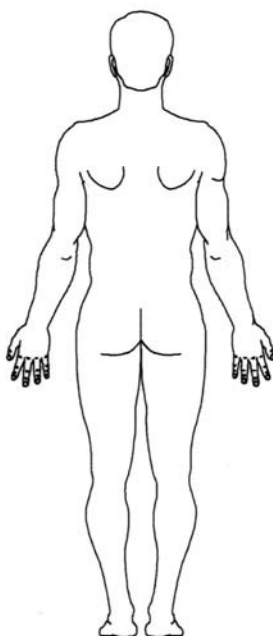
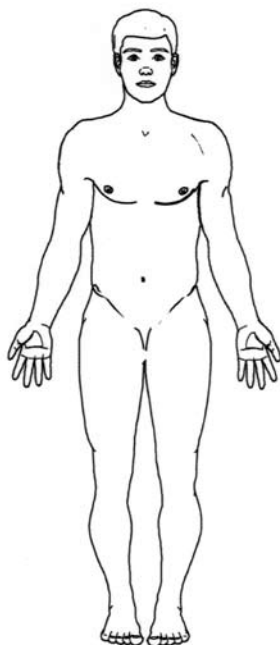
Urinary and sexually transmitted diseases (Specification of symptoms)

Date		Name of patient		Identity number	
SYMPTOMS (always check the patient's preliminary information, see Preliminary information form)					
Urinating <input type="checkbox"/> no specific symptoms <input type="checkbox"/> stinging sensation when urinating <input type="checkbox"/> frequent need to urinate <input type="checkbox"/> amount of urine per urination decreased <input type="checkbox"/> weak flow of urine <input type="checkbox"/> difficulties in urinating		Leaking from the urethra <input type="checkbox"/> no leaking <input type="checkbox"/> clear substance leaking from urethra <input type="checkbox"/> cloudy substance leaking from urethra		Skin symptoms <input type="checkbox"/> no skin symptoms <input type="checkbox"/> itching in genitals <input type="checkbox"/> ulcer on skin <input type="checkbox"/> cysts on skin <input type="checkbox"/> red spots or rash on genitals	
Other symptoms <input type="checkbox"/> none <input type="checkbox"/> tender testicles <input type="checkbox"/> pain in back <input type="checkbox"/> pain in groin					
EXAMINATION (First examine consciousness, respiration and blood circulation, see Basic vital functions form)					
Pain <input type="checkbox"/> none <input type="checkbox"/> pain increases when stomach pressed <input type="checkbox"/> tenderness in kidney area on percussion		Tenderness of the stomach <input type="checkbox"/> no tenderness on palpation <input type="checkbox"/> some tenderness on palpation, where? <input type="checkbox"/> top right <input type="checkbox"/> top left <input type="checkbox"/> navel area <input type="checkbox"/> bottom right <input type="checkbox"/> bottom left		Abdominal wall <input type="checkbox"/> soft <input type="checkbox"/> board-like Intestinal sounds <input type="checkbox"/> normal <input type="checkbox"/> increased <input type="checkbox"/> absent	
Lumps <input type="checkbox"/> lumps can be felt <input type="checkbox"/> lump in stomach <input type="checkbox"/> lump/s in groin, not tender <input type="checkbox"/> tender lump/s in groin <input type="checkbox"/> swelling in groin, which disappears when lying down					
Genitals <input type="checkbox"/> no specific symptoms <input type="checkbox"/> enlarged testicle <input type="checkbox"/> tender testicle <input type="checkbox"/> clear substance leaking from urethra <input type="checkbox"/> cloudy substance leaking from urethra <input type="checkbox"/> ulcer on skin <input type="checkbox"/> cysts on skin <input type="checkbox"/> red spots or rash on genitals		Temperature (°C) <input type="checkbox"/> normal (36–37.5°C) <input type="checkbox"/> fluctuating		Urine <input type="checkbox"/> no specific symptoms <input type="checkbox"/> blood-red urine <input type="checkbox"/> coffee-coloured urine Test strip examination <input type="checkbox"/> protein in urine <input type="checkbox"/> sugar in urine <input type="checkbox"/> blood in urine <input type="checkbox"/> inflammatory cells in urine	
Sexual contacts <input type="checkbox"/> time of contact? <input type="checkbox"/> country?					
If necessary, mark the location of symptoms and ailments on the pictures below					



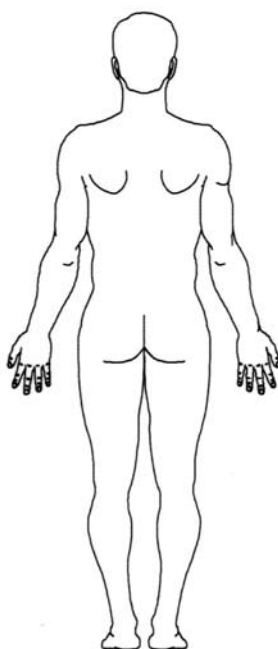
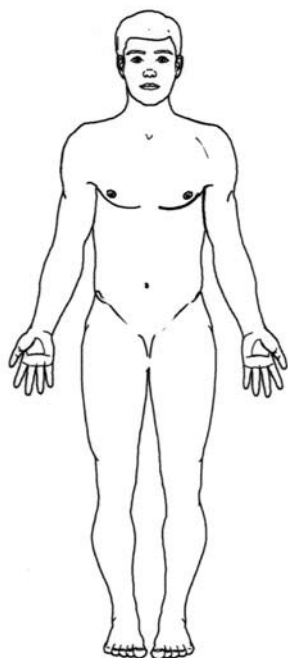
Psychological symptoms (Specification of symptoms)

Date	Name of patient	Identity code
SYMPTOMS (Always check patient's preliminary information, see Preliminary information form)		
Physical symptoms <input type="checkbox"/> no physical symptoms <input type="checkbox"/> vertigo <input type="checkbox"/> nausea <input type="checkbox"/> ache, where? <input type="checkbox"/> sweating <input type="checkbox"/> tremor	Psychological symptoms <input type="checkbox"/> nothing specific <input type="checkbox"/> sleeping difficulties <input type="checkbox"/> nightmares <input type="checkbox"/> depression, apathy <input type="checkbox"/> memory problems <input type="checkbox"/> tiredness, exhaustion <input type="checkbox"/> anxiety, fears, phobias	
EXAMINATION / INTERVIEW (First check consciousness, respiration and blood circulation, see Basic vital functions form)		
Changes in patient <input type="checkbox"/> not detected <input type="checkbox"/> appearance <input type="checkbox"/> behaviour <input type="checkbox"/> movement <input type="checkbox"/> speech <input type="checkbox"/> social intercourse <input type="checkbox"/> mood <input type="checkbox"/> level of consciousness	Patient's mood and way of thinking <input type="checkbox"/> no abnormality <input type="checkbox"/> obsessions <input type="checkbox"/> estrangement from reality <input type="checkbox"/> hallucinations (hearing voices or having visions) <input type="checkbox"/> confusion <input type="checkbox"/> apathy; is patient withdrawn? <input type="checkbox"/> hyperactivity, excessive talkativeness	Examination of other systems Examine the state of different systems and organs on the basis of the symptoms that the patient has complained about (see other examination forms)
If necessary, mark the location of symptoms and ailments on the figures below		



Skin diseases (Specification of symptoms)

Date		Name of patient		Identity code	
SYMPTOMS (always check the patient's preliminary information, see Preliminary information form)					
Skin symptoms (where?)		General symptoms		Symptoms in other organs	
<input type="checkbox"/> skin appears healthy <input type="checkbox"/> reddish <input type="checkbox"/> itching <input type="checkbox"/> ulcerations <input type="checkbox"/> scaling <input type="checkbox"/> seeping <input type="checkbox"/> swelling <input type="checkbox"/> pain		<input type="checkbox"/> feeling well <input type="checkbox"/> feeling unwell <input type="checkbox"/> fever <input type="checkbox"/> other symptoms (see relevant examination forms)		see relevant examination forms	
EXAMINATION (First check consciousness, respiration and blood circulation, see Basic vital functions form)					
Skin surface		Depth of the rash	General condition	Examination of other organs:	
<input type="checkbox"/> nothing specific <input type="checkbox"/> reddish <input type="checkbox"/> scratch marks <input type="checkbox"/> elevated spots <input type="checkbox"/> blisters <input type="checkbox"/> ulcers <input type="checkbox"/> scaling of the skin and scalp <input type="checkbox"/> seeping skin, pus		<input type="checkbox"/> superficial <input type="checkbox"/> deep Extent of the rash <input type="checkbox"/> limited to a certain skin area <input type="checkbox"/> covers the whole skin <input type="checkbox"/> no rash on the head area	<input type="checkbox"/> normal <input type="checkbox"/> feeling ill, appears ill Body temperature (degrees) <input type="checkbox"/> normal (36–37.5°C) <input type="checkbox"/> fluctuating	Check the condition of the different organs on the basis of the symptoms reported by the patient	
If necessary, mark the location of symptoms and ailments on the figures below					



59 Treatment on board

(Record dates and times!)

Name of patient _____ Identity code _____

Radio Medical consultation: no/yes, when: date _____

Place of consultation: _____

Name of doctor: _____

Instructions given: _____

Medical treatment (take note of possible allergies!)

Name of drug and date of prescription	Effectiveness of drug	Dosage	Duration of medical treatment

Other treatment

Patient unable to work: no/yes

Patient ordered bed rest: no/yes

Further measures

Patient evacuated from ship: no/yes, when, how and where

Patient sent to doctor in port: no/yes, when and where

Patient requested to consult a doctor on return home: no/yes, reason for referral, urgency

Date, signature of nurse, clarification of name

60 Patient follow-up form

Temperature	Pulse	12.30	14.00	15.45	o'clock	o'clock	o'clock	o'clock	o'clock	o'clock	o'clock	o'clock	o'clock
Blood pressure		p.m.	p.m.	p.m.									
200													
42													
180													
41			V										
160	V												
40													
140				V									
39													
120													
38													
100	o	x											
37	x	Λ o	o										
80	Λ		Λ										
36			x										
60													
35													
Rate of respiration	20												
34	15		■										
10		■		■									
5													

Notes: Blood pressure V (Systolic) Λ (Diastolic); Pulse x; Temperature (°C) o; Respiration rate ■

The drugs mentioned in the book; concentrations, drug forms and treatment equipment

1. DRUGS FOR CARDIOVASCULAR DISEASES

A	Glyceryl nitrate	0.5 mg	tablet
B	Acetylsalicylic acid	100 mg	tablet
C	Furosemide	40 mg	tablet
		10 mg/ml	injection
D	Metoprolol tartrate	25 mg	tablet

2. DRUGS FOR DIGESTIVE DISEASES

A	Hyperacidity drugs		chewing tablet
B	Omeprazole	20 mg	tablet
C	Metoclopramide hydrochloride	10 mg	tablet
		20 mg	suppository
		5 mg/ml	injection
D	Bisacodyl	5 mg	tablet
E	Sodium citrate		mini-enema
F	Loperamide hydrochloride	2 mg	capsule
G	Prednisolone cinchocaine hydrochloride		suppository
			cream

3. ANTIPYRETICS AND PAINKILLERS

A	Paracetamol	500 mg	tablet
B	Diclofenac	50 mg	tablet
		100 mg	suppository
		25 mg/ml	injection
C	Morphine	20 mg/ml	injection

4. DRUGS THAT AFFECT THE NERVOUS SYSTEM

A	Diazepam	5 mg	tablet
		5 mg/ml	injection
B	Dixyrazine	25 mg	tablet
C	Cyclizine hydrochloride	50 mg	tablet

5. ALLERGY MEDICATION

A	Adrenaline	1 mg/ml	injection
B	Cetirizine hydrochloride	10 mg	tablet
C	Hydrocortisone	125 mg/ml	injection
D	Prednisolone	5 mg	tablet

6. DRUGS FOR RESPIRATORY AND LUNG DISEASES

A	Salbutamol	2 mg	tablet
		0.2 mg	inhalation spray
B	Cough suppressant		tablet
			syrup
C	Bromhexine	8 mg	tablet
D	Xylometazoline		nasal solution

7. ANTI-INFLAMMATORY DRUGS, ANTIBIOTIC DRUGS

A	Phenoxyethylpenicillin	660 mg	tablets
B	Doxycycline	150 mg	tablets
C	Ciprofloxacin	250 mg	tablets
D	Cefuroxime	750 mg/3 ml	injection
E	Cefadroxil	500 mg	tablets

8. DRUGS FOR RESUSCITATION, AND CASES OF POISONING

A	Adrenaline	1 mg/ml	injection
B	Insulin (short-acting)	100 IU/ml	injection
C	Glucagon	1 mg/ml	injection
D	Medicinal charcoal	50 g	granules
E	Basic infusion solution		solution

9. SUBSTANCES FOR SKIN AND WOUND CARE

A	Polyvidone iodine solution	10%	solution
B	Chlorhexidine hydrocortisone		cream
C	Miconazole		emulsion cream
			powder
D	Neomycin-bacitracin		ointment
E	Vaseline dressings		dressings
F	Hydrocortisone	1%	emulsion cream
G	Methylrosanilinium	0.5%	solution
H	Permethrin	5%	cream
I	Malathion	1%	shampoo

10. OPHTHALMOLOGIC DRUGS

A	Tetrahydrozoline hydrochloride	0.5 mg/ml	eye drops
B	Chloramphenicol	5 mg/ml	eye drops
		1 mg/ml	eye ointment
C	Oxybuprocain hydrochloride	4 mg/ml	eye drops
D	Pilocarpine hydrochloride	20 mg/ml	eye drops

11. OTORHINOLARYNGOLOGIC DRUGS

A	Flumethasone-clioquinol	0.2 mg + 10 mg/ml	ear drops
B	Pain-relieving ear drops		ear drops
C	Earwax removal drops		drops

12. MOUTH AND LARYNX DISINFECTANTS

A	Mouthwash		solution
B	Larynx disinfectant		tablets

13. LOCAL ANAESTHETICS

A	Lidocaine	1%	injection
B	Lidocaine	2%	gel

14. DENTAL CARE PRODUCT

A Dental cement

15. TOPICAL GYNAECOLOGICAL MEDICATION

A	Miconazole	400 mg	vagitory
B	Methylergometrine maleate	0.125 mg	tablet

16. RINSING AND CLEANSING SOLUTIONS

A	Chlorhexidine acetate	0.5 mg/ml	solution
B	Disinfection solution for instruments and general use		solution
C	Saline solution (0.9% NaCl®)		solution

17. DIAGNOSTIC PRODUCTS

- A Strip for indicating sugar, proteins, blood, pH and leukocytes in urine
- B Strip for determining sugar level in blood

Treatment equipment

1. Resuscitation and intubation equipment

- Batteries for laryngoscope
- Binding tape
- Disposable face mask
- First aid guide book
- Hand-operated resuscitation device + face mask
- In-leader for intubation tube
- Intubation tube
- Laryngoscope
- Magill's clamp, for adults
- Middle piece for intubation tube
- Mucus catheter
- Oxygen mask + oxygen bottle + spare oxygen bottle
- Pharyngeal tube
- Protective gloves
- Resuscitation mask for mouth-to-mouth respiration
- Suction device and suction catheter
- Thermal sheet
- 10 ml syringe

2. Dressing and suture materials

- Adhesive plaster
- Adhesive support bandage
- Cover bandage
- Elastic bandage
- Elastic fixative bandage
- Eye shields
- First aid bandage
- Medicated dressing
- Sterile gauze
- Stitch cutter
- Suture needle and thread
- Suture strips
- Triangular bandage
- Tubular gauze
- Tubular net
- Wound bandage
- Wound wipe

3. Instruments

- Anatomic tweezers
- Clamp
- Horner's spud
- Instrument chest
- Needle holder
- Safety pin
- Scalpel
- Scissors
- Shaver
- Splinter removal tweezers
- Surgical drape
- Surgical tweezers

4. Examination and follow-up equipment

- Cotton swab
- Ear lamp
- Ear lamp funnel
- Examination gloves
- Kidney bowl
- Magnifying glass
- Protective bed cover
- Protective gloves
- Sphygmomanometer
- Stethoscope
- Thermometer
- Tourniquet
- Wooden spatula

5. Injection, perfusion, puncture and catheterization equipment

- Aural syringe
- Catheterization kit
- Hypodermic syringe 1 ml, 2 ml, 5 ml
- Infusion apparatus
- Infusion apparatus bottle holder
- Injection needle
- Skin cleansing pads
- Urine catheter
- Vein cannula

6. Splinting and supporting equipment

- Neck support
- Splints
- Stretcher, suitable for transporting the patient in stairs and ladders

7. General treatment equipment

- Bedpan
- Condoms
- Ice bag – warm bag
- Paper bag
- Sanitary napkin

Index

- abdomen 189
- abdominal injuries 28
- abdominal pain 79
- abscesses 101
- addictive substances 113
- AIDS 96
- airways; diseases 72
- alcohol 48, 113, 135
- alcohol poisoning 48
- allergic reaction 17, 71
- ammonia 50
- amphetamine 115
- amputation 35
- anaesthetizing a wound 148
- anaphylactic reaction 17, 71
- appendicitis 81
- arrhythmia 68
- arterial thrombosis 70
- asthma 73
- asthma attack 71
- athlete's foot 101
- attack of gall stones 82
- back pain 108
- back; structure and functions 190
- bleeding shock 17
- bleeding; stopping 15, 35, 145
- blood pressure 185
- blood pressure, high 68
- blood pressure, low 69
- blood pressure, measuring 143
- blood sugar 131
- blood sugar, high 123
- blood sugar, low 122
- blood; structure and functions 174
- body temperature, lowered 41
- bone injury 30
- breathing 184
- breathing difficulty 70
- bronchitis 73, 74
- burn 36
- cannabis 115
- carbon dioxide 49
- carbon monoxide 49
- cardiac arrest 9
- cardiac infarction 67
- catheterization 152
- cerebral contusion 23
- cerebral haemorrhage 22
- cheek pain 64
- chest pain 66
- chest; structure and functions 189
- childbirth 87
- chlamydia 95
- chlorine 50
- choking 14
- cholecystitis 82
- cholera 78
- cocaine 117
- colitis 84
- common cold 73
- communicable diseases 118
- concussion 23
- condom 95
- condyloma 96
- confidentiality 168
- congestive heart failure 68
- consciousness 56, 184
- constipation 78
- contagious diseases 118
- coronary artery disease 67
- cyanide 50
- dangerous cargo 45
- death 162
- debriefing 111
- depression 111
- diabetes 122
- diarrhoea 76
- digestive system; structure and functions 175
- diphtheria 121
- dislocation 33
- dizziness 55
- drowning 44
- drug abuse 113
- drug injections 135
- drug poisoning 49
- ear ache 63

- ear wax in the external ear 63
- ear; itching 63
- ear; structure and functions 179, 187
- ecstasy 115
- ectopic pregnancy 86
- eczema 99
- eczema, fungal 101
- electric shock 40
- emergency first aid 8
- endocrine system 180
- epididymitis 92
- epidural bleeding 23
- erysipelas 101
- ethylene glycol 49
- evacuation 155
- examining the patient 181
- extrauterine pregnancy 86
- eye burns 27
- eye diseases 60
- eye drops 137
- eye injury 24
- eye ointment 138
- eye, removing a foreign object from 24
- eye; bleeding 26
- eye; corrosion wound 27
- eye; penetration wound 27
- eye; radiation injury 26
- eye; structure and functions 179, 187
- eyelid injuries 26
- face; structure and functions 186
- fainting 58
- fainting due to heat 39
- fallopian tubes; infection/inflammation 86
- fever 75
- fluid balance 80
- folliculitis 101
- food poisoning 77
- foreskin, tight 92
- fracture; see respective body part
- frost injury 38
- fungal infection of the feet/toes 101
- gall bladder; inflammation 82
- gall stones; attack 82
- gastric ulcer 83
- gastrointestinal tract; structure and functions 176
- Glasgow Coma Scale 184
- gonorrhoea 95
- groin; rash 104
- gums, infected 66
- gynaecological disorders 84
- haemorrhoids 78
- hallucinogens 117
- hand hygiene 156
- hashish 115
- headache 52
- heart attack 67
- heart rhythm; disorders 68
- heart; structure and functions 172
- heat exhaustion 39
- heat spasm 39
- heat stroke 39
- heat-induced illness 38
- hepatitis 120
- Hepatitis A 120
- hernia incarceration 83
- heroin 115
- herpes 86
- high blood pressure 68
- high blood sugar 123
- HIV 96
- hoarseness of the voice 62
- human body; structure and functions 172
- hydrochloric acid 49
- hydrofluoric acid 50
- hydrogen cyanide 50
- hyperglycaemia 123
- hypertension 68
- hypoglycaemia 122
- hypotension 69
- hypothermia 41
- ileus 83
- impetigo 99
- infection; see respective organ or body part
- infectious diseases 118
- inflammation; see respective organ or body part
- influenza 73
- inguinal flexure; rash 104
- injections of medications 135
- inoculations 161
- instruments; cleaning and disinfection 156
- intestinal obstruction 83
- intraocular pressure; rise 61
- intravenous (IV) infusion therapy 139

- intubation 127
- iris; infection 61
- jaundice 120
- joint injuries 33
- joint pain 107
- khat 115
- large intestine; inflammation 84
- liver; rupture 30
- liver; structure and functions 176
- low blood pressure 69
- low blood sugar 122
- lumbago 108
- lymphatic system; structure and functions 175
- lymphatic tissue; structure and functions 175
- malaria 119
- mania 112
- marijuana 115
- maxillary sinusitis 64
- medicines 133
- mental disorder 109
- methanol 49
- migraine 53
- miscarriage 87
- moles 105
- morphine 115
- motion sickness 55
- mouth problems 65
- mouth; structure and functions 188
- muscle injuries 35
- muscle pain 107
- muscles; structure and functions 172
- nausea 75
- neck and shoulder pain 107
- neck; structure and functions 188
- nervous system; structure and functions 178
- nevus 105
- nitric acid 49
- nose; structure and functions 188
- nosebleed 64
- obstetrics 84
- opiates 115
- opium 115
- orchitis 92
- ovaries; infection/inflammation 81
- pain; see respective organ or body part
- pancreas; inflammation 81
- pancreas; structure and functions 176
- panic disorder 110
- paraphimosis 92
- patient information, recording 194
- patient placed on his/her side 10
- patient; positioning 153
- personality disorder 111
- pharyngeal tube 126
- pharynx; structure and functions 188
- phenol 50
- phlebitis 69
- pleural sack; inflammation 71
- pneumonia 71, 73
- pneumothorax 71
- poisoning 45
- positioning a patient 153
- post-traumatic stress disorder 111
- priority classification 19
- prostatitis 92
- protective gloves 106
- protective ointments 106
- psychosis 112
- pulmonary embolism 69
- pulse 10, 185
- Radio Medical 166
- rash 98
- rash in the inguinal flexure (groin) 104
- reproductive system; structure and functions 177
- respiration 184
- respiratory arrest 9
- respiratory diseases 72
- respiratory system; structure and functions 175
- resuscitation 9
- resuscitation drugs 13
- rib, fractured 32
- ruptured liver 30
- ruptured spleen 29
- salmonella 77
- SARS 74
- scabies 104
- sciatica 108
- sea sickness 55
- seizures 59
- self-protection 160
- Severe acute respiratory syndrome (SARS) 74
- sexually transmitted diseases (STD) 93

- shigella 77
- shock 16
- shoulder pain 109
- sinus pain 64
- skeletal system; structure and functions 172
- skin neoplasm 105
- skin temperature 186
- skin, dry 97
- skin, itchy 98
- skin; structure and functions 180, 186
- skull fracture 23
- skull injuries 22
- spinal fracture 32
- spleen; rupture 29
- sprain, strain 33
- STD 93
- stomach 189
- stomach ache 79
- stopping bleeding 15, 35, 145
- stye 60
- subdural bleeding 23
- sulphuric acid 49
- sunstroke 38
- superficial venous inflammation 69
- suturing a wound 148
- syphilis 95
- teeth, problems with 65
- tendinitis 109
- tension headache 53
- testicles; inflammation 92
- thermoregulation of organs 41
- throat, sore 62
- tooth, broken 65
- tooth, detached 65
- toothache 65
- triage 19
- tuberculosis 74
- unconsciousness 56
- urinary retention 92, 152
- urinary stone 91
- urinary system; structure and functions 177
- urinary tract infection 91
- uroolith 91
- uterus; infection 86
- vaccinations 161
- venereal diseases 93
- venous thrombosis 69
- vertigo 55
- voice; hoarseness 62
- vomiting 75
- wound; anaesthetizing 148
- wound; closing with stitches, suturing 148
- wounds 144
- yeast infection 85
- yellow fever 121
- yersinia 78