Clinical guidelines

Diagnosis and treatment manual

for curative programmes
in hospitals and dispensaries

guidance for prescribing

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Seventh Edition Editorial Committee:

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Foreword

This diagnostic and treatment manual is designed for use by medical professionals involved in curative care at the dispensary and hospital levels.

We have tried to respond in the simplest and most practical way possible to the questions and problems faced by field medical staff, using the accumulated field experience of Médecins Sans Frontières, the recommendations of reference organizations such as the World Health Organization (WHO) and specialized works in each field (see *Bibliography*, page 338).

This 7th edition touches on the curative and, to a lesser extent, the preventive aspects of the main diseases encountered in the field. The list is incomplete, but covers the essential needs.

This manual is used not only in programmes supported by Médecins Sans Frontières, but also in other programmes and in other contexts. It is notably an integral part of the WHO Emergency Health Kit.

Médecins Sans Frontières has also issued French and Spanish editions. Editions in other languages have also been produced in the field.

This manual is a collaborative effort of medical professionals from many disciplines, all with field experience.

Despite all efforts, it is possible that certain errors may have been overlooked in this manual. Please inform the authors of any errors detected. It is important to remember, that if in doubt, it is the responsibility of the prescribing medical professional to ensure that the doses indicated in this manual conform to the manufacturer's specifications.

The authors would be grateful for any comments or criticisms to ensure that this manual continues to evolve and remains adapted to the reality of the field.

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This manual is also available on the internet at www.msf.org. As treatment protocols for certain diseases are constantly changing, medical staff are encouraged to check this website for updates of this edition.

How to use this manual

Organization

There are two easy ways to find information in this manual:

– The ***table of contents*** at the beginning of the manual with the number and title of each chapter, their subsections and page numbers.

– An ***alphabetical index*** at the end of the manual with the names of the diseases and symptoms.

Names of drugs

The International Non-proprietary Name (INN) of drugs is used in this manual. A list of current proprietary names can be found at the end of the manual.

Abbreviations used

Units

kg	=	kilogram
g	=	gram
mg	=	milligram
µg	=	microgram
IU	=	international unit
M	=	million
mmol	=	millimole
ml	=	millilitre
dl	=	decilitre

Administration route

PO	=	per os = oral
IM	=	intramuscular
IV	=	intravenous
SC	=	subcutaneous

For certain drugs

NSAID	=	nonsteroidal anti-inflammatory drug
SP	=	sulfadoxine + pyrimethamine
SMX + TMP	=	sulfamethoxazole + trimethoprim = cotrimoxazole

Expression of doses

– Doses of the combination sulfamethoxazole + trimethoprim (cotrimoxazole) are expressed as SMX + TMP, for example:
Children: 30 mg SMX + 6 mg TMP/kg/day
Adults: 1600 mg SMX + 320 mg TMP/day

– Doses of the combination amoxicillin + clavulanic acid (co-amoxiclav) are expressed in amoxicillin.

– Doses of certain antimalarial drugs are expressed in base (and not in salts).

– Doses of iron are expressed in elemental iron (and not in ferrous salts).

Table of contents

Introduction

Curative care is one component of health programmes. It is important to remember that the other components also need to be developed. These components include programmes focusing on: palliative care (including pain control), psychological support, prevention (including the Expanded Programme of Immunization (EPI), maternal-child health etc.), nutrition, water, hygiene and sanitation.

I - The objectives of curative care programmes

– *At an individual level*: to cure the patient of disease and to minimize or prevent the consequences for the individual and those in close contact (i.e. preventing transmission when possible).
– *At a population level*: to reduce the mortality and the consequences of morbidity of the most prevalent and important diseases in the population.
– *For certain endemic diseases* (tuberculosis, leprosy, trypanosomiasis etc.): curative care can reduce transmission if a large enough proportion of the population is treated. Often, this objective is only achieved through specific control programmes which are not extensively discussed in this manual.

II - Strategy

When defining a strategy for a medical intervention, medical decision makers must take into account the priority diseases: those with the highest frequency and mortality.
Priority diseases vary with context (conflict, natural disasters, etc.) and geographical region. Nevertheless, there is a relatively standard epidemiological profile with quantitative variations. An initial assessment, both qualitative (disease distribution) and if possible quantitative (mortality, incidence, prevalence and case fatality), is still necessary. This evaluation identifies the most common diseases (diarrhoea, measles, acute respiratory tract infections, malaria, wounds etc.) and the population groups exposed and at risk (children under 5 years, pregnant women).
These diseases and populations constitute the priority 'targets' of a programme.
For rehabilitation programmes and programmes to support pre-existing health structures, detailed information is sometimes available from the health structures or from the Ministry of Health. The evaluation consists of assessing the information available and filling in any missing data.
In very isolated contexts or when there is population displacement, no information is available and it is always necessary to do a complete assessment.
Once the priority diseases are identified and health policy, means and resources (list of essential drugs, Ministry of Health protocols, staff and level of training, health services, functioning programmes etc.) are known, programmes can be defined and initiated.
This manual and the manual, *Essential drugs – practical guidelines*, are tools to help in the definition and implementation (protocols, training, retraining) of curative programmes.

III - Means to consider and measures to develop

In certain situations (displaced populations, refugees), entire systems must be created. In other situations, an existing system is evaluated and may be supported if necessary.

Infrastructure and health staff

The training and competence level of medical staff (medical auxilaries, medical assistants, nurses, midwives, doctors etc.) vary by country and health structure (health post, dispensary, health centre, hospital).
Evaluation should identify their technical level while recognising that in some situations, the staff have not always received prior training.

Drugs

Selection of drugs depends on the priorities and needs, but also on other criteria:
– effectiveness, local resistance, adverse effects
– administration route, length of treatment, number of doses per day, expected compliance
– stability, availability, price
The WHO Essential Medicines List is the basic framework[1], but the choice of drugs has to be adapted to the epidemiological profile, the competence of the staff and the possibility (or lack thereof) to refer very sick patients.

Certain drugs proposed in this manual are not included in the WHO Essential Medicines List.

Treatment protocols

Standard protocols improve diffusion and use of effective treatment. They should:
– give precise instructions (INN of the medication, indications, dosage, route of administration, length of treatment, contra-indications, adverse effects, precautions);
– favour the most effective drug with the least adverse effects;
– be supported by clinical, epidemiological and scientific data and be discussed and agreed upon by the users;
– be practical, simple, understandable and adapted to the field;
– facilitate the training and retraining of medical staff;
– facilitate the organization of health services (e.g. management, pharmacy);
– be evaluated.

The treatment protocols include drug prescription, as well as other measures (curative and preventive), indications for referral to a higher level of care and an indication of which diseases must be reported (cholera, measles etc.).

Formulation depends on the training of the prescribing medical staff: doctors are trained in terms of diseases (pneumonia, malaria etc.) while medical auxilaries use a symptomatic approach (cough and difficulty in breathing, fever and chills etc.).

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1 A list of the names and quantity of drugs in The *New Emergency Health Kit 98* developed with the Essential Medicines Programme of the WHO is presented in annexes.

Protocols must take into account the cultural context (e.g. to discourage covering a febrile child if that is the cultural practise) and the environment (avoid the classic mistakes, e.g. recommending that water be boiled when fuel or firewood is scarce).

The protocols must take into account drug supply (what is the availability?) and presentation (e.g. are the antimalarials labelled in salts or base?).

Protocols must facilitate compliance. Short treatments with few doses are recommended. Single dose treatment, when indicated, is the best choice. The number of different drugs prescribed must also be limited whenever possible. For similar effectiveness oral or rectal drugs are preferred over injections in order to reduce complications, cost, risk of transmission of hepatitis B, HIV etc.

Diagnostic methods

The methods used depend on the services available and the technical level of the staff. They have a direct influence on the establishment of protocols and the content of the drug list. Usually diagnosis is made on a basis of history taking, clinical examination and basic laboratory tests (as defined by the WHO).

A - History taking

A medical consultation is a special occasion to listen to the patient and to ask relevant questions to determine the cause of the complaint.
During the interview, the history of the current illness, the signs and symptoms, prior illness and any treatment already received are specified.
Only by listening attentively is it possible to put the patient's complaint in a larger context of suffering. For example, during a consultation, physical violence, sexual violence or abuse may come to light, while this type of complaint is rarely expressed spontaneously by the victim. It is the clinician's responsibility to take a global view of the situation that includes: psychological, legal (completing a medical certificate) and social aspects and direct clinical care.

B - Clinical examination

Clinical examination is essential: the diagnosis and treatment depend directly on it's quality. It is important to know or to learn a technique of clinical assessment that is both complete and rapid, keeping in mind the need for quality and efficiency. A technique, or a strategy, is even more important in field conditions as the number of patients often stretches the medical possibilities and apart from basic laboratory examinations, the complementary examinations are often nonexistent.
The following examination framework is an example that should be adapted to each case. It emphasises the advantages of a systematic approach.

Context of the examination

– Routine examination: e.g. prenatal consultation or Mother and Child Health (MCH). The emphasis of the examination is predefined by the programme objectives (nutritional state, anaemia, prevention of tetanus etc.).
– As a result of a complaint: the usual situation at a dispensary. The most common complaints are fever, pain, diarrhoea and cough.

A few rules

– A systematic approach reduces omissions and saves time.
– An interpreter may be needed; however, translation does not always accurately reflect the complaints of the patient. Learning the names of the main clinical signs and common diseases in the local language helps overcome this problem. The choice of an interpreter must take into consideration the sex (e.g. a female for gynaecology and obstetrics) and the acceptability by the patient (respecting confidentiality).

The examination

– *Physical examination*: the patient should be undressed if possible.
  • first look at the general condition of the patient in order to judge the severity of illness: nutritional status (weight and, in children, height), hydration, anaemia, temperature.
  • examine each system: use a systematic approach starting with the system related to the patient's complaint.
– *Laboratory examinations*: if necessary and if available
– *Imaging techniques*: x-ray and ultrasonography, if necessary and if available

C - Role of the laboratory

A basic medical laboratory can play an important and irreplaceable role. However, technical constraints (the need for a trained and competent technician), logistical constraints (regular supply of material, reagents, electricity), time constraints (each examination takes a minimum time) and quality constraints (which depends on all the points just mentioned) should not be underestimated.
Two levels of examinations can be defined:

Basic examination

Blood	*Haematology* • haemoglobin (Lovibond) • WBC and differentials *Transfusion* • blood group + rhesus • HIV, hepatitis B and C, syphilis RPR *Thick and thin films* • malaria, some filariases, trypanosomiasis, visceral leishmaniasis, borreliosis *Rapid tests* • malaria • HIV, hepatitis B and C etc.
Sputum	Koch's bacillus
Urine	reagent strip test (glucose, protein)
Genital discharge	gonococcus, trichomonas
Stool	• examination of wet preparation (eggs, helminths, cysts, protozoa) • scotch-test
CSF	• look for and identify pathogens (including rapid test for meningitis) • cell count and protein (Pandy test)

More specific examinations are defined in relation to the programme.

A laboratory can be used in three complementary ways:

– *Clinically*: examinations are requested for individuals depending on the clinical picture. The aim is to orient a diagnosis (e.g. leucocytosis in a full blood count) or to determine or eliminate an aetiology (e.g. stool examination for parasites, blood smear, rapid test).
– *Epidemiologically*: the objective is to facilitate diagnosis and treatment. By studying a sample of patients presenting with similar clinical profiles an aetiology can be specified. The validity (sensitivity and specificity) of the particular symptoms or syndrome can also be studied. Through these means appropriate treatment protocols can be introduced for all patients presenting with the same symptoms or syndrome.
  For example: is the syndrome non-febrile bloody diarrhoea predictive of amoebic dysentery? An investigation of approximately 100 patients will answer this question. If a significant proportion of the samples are positive, an appropriate treatment can be given to all patients presenting with this syndrome. This approach, while practical during some epidemics, should not stop the practitioner from considering differential diagnosis as the sensitivity of a syndrome is rarely 100%
– *Operational research*: laboratory examinations are also used during resistance studies (malaria) and for other operational research.

The combination of **clinical examination** and **complementary examinations** should result in an aetiological diagnosis if possible, if not, a symptomatic or syndromic diagnosis.

Treatment

Prescribe a treatment:
– aetiological (treat the cause)
– symptomatic
– give relevant advice, whether or not the patient was treated
or refer.

Recording data and the individual patient record

Record the essential information in a register and on an individual patient record (see the example of a health card, annex 3), an examination card or in a family health booklet. Information should include:
– diagnosis is important positive and negative signs (e.g. bloody diarrhoea without fever)
– laboratory examinations requested and the results
– drugs prescribed (in INN), dosage, duration

Training

Training and retraining of staff should be carried out according to their technical level (this should be evaluated) and is therefore context dependent. This manual and other documents may be useful tools in defining and meeting training objectives.

Public awareness and dissemination of information

For many reasons (lack of information, different cultural perceptions), a significant proportion of seriously ill, but curable patients may not present at health centres for treatment, or may present only when they are in the advanced stages of disease. Public awareness and dissemination of information at all levels, along with the quality of services, contribute to increase the proportion of the population receiving appropriate care.

IV - Organization and management

They are related to the services and resources available.

V - Programme evaluation

Programme evaluation is carried out at different levels:

Functioning

Assessment of activities, trends in case fatality rates, respect of protocols, management of the pharmacy, drug consumption, quality of prescriptions, orders, reports, the register etc.
This information helps in programme management (orders, staffing). The morbidity data collected at the dispensary level and their analysis contribute to epidemiological surveillance. Trends of priority diseases by person, time and place can be monitored (see *Epidemiological reports*, annex 2) and an early warning systems can be put in place.

Coverage of need

This depends on the accessibility and on the population's perception of the health care system. The goal is to determine the proportion of sick people who are actually being treated. The evaluation is feasible by surveying representative samples of the population (see below).

Impact on the population

The evaluation is complex. It refers to the objectives of reducing mortality, morbidity, etc. Survey protocols exist but are very difficult to put into practice (large sample size) and the surveys must be repeated to show trends.

CHAPTER 1

A few symptoms and syndromes

Shock

Acute circulatory failure leading to inadequate tissue perfusion which, if prolonged, results in irreversible organ failure. Mortality is high without early diagnosis and treatment.

Aetiology and pathophysiology

Hypovolaemic shock

– **Absolute hypovolaemia** by significant intravascular fluid depletion:
  • Internal or external haemorrhage: post-traumatic, peri or postoperative, obstetrical (ectopic pregnancy, uterine rupture etc.), blood loss due to an underlying condition (gastrointestinal ulcer etc.). A loss of 30 to 50% of blood volume will lead to haemorrhagic shock
  • Dehydration: severe diarrhoea and vomiting, cholera, intestinal obstruction, diabetic ketoacidosis or hyperosmolar coma etc.
  • Plasma leaks: extensive burns, crushed limbs etc.
– **Relative hypovolaemia** due to acute vasodilation without concomitant increase in intravascular volume:
  • Anaphylactic shock with extreme vasodilation: allergic reaction to insect bites or stings; drugs, principally antibiotics, acetylsalicylic acid, neuromuscular blockers, colloid solutions (dextran, modified gelatin fluid); equine sera; vaccines containing egg protein; food etc.
  • Acute haemolysis: severe malaria, drug poisoning (rare)

Septic shock

By a complex mechanism often including vasodilation, heart failure and absolute hypovolaemia.

Cardiogenic shock

By decrease of cardiac output:
– Direct injury to the myocardium: infarction, contusion, trauma, poisoning or drug toxicity
– Indirect mechanism: arrhythmia, constrictive pericarditis, haemopericardium, pulmonary embolism, tension pneumothorax, valvular disease, severe anaemia, beri beri etc.

Clinical signs

Signs common to most forms of shock

– pallor, mottled skin, cold extremities, sweating, thirst
– rapid and thready pulse often only detected on major arteries (femoral or carotid)
– low blood pressure (BP), narrow pulse pressure, BP sometimes undetectable
– cyanosis, respiratory signs (dyspnoea, tachypnoea) are often present in varying degrees depending on the mechanism
– consciousness may be maintained, but anxiety, confusion, agitation or apathy are common
– oliguria or anuria

Signs specific to the mechanism of shock

– **Hypovolaemic shock**
  The common signs of shock listed above are typical of hypovolaemic shock.
  Warning: do not underestimate hypovolaemia. Signs of shock may not become evident until a 50% loss of blood volume.

– **Allergic or anaphylactic shock**
  • significant and sudden drop in BP
  • tachycardia +++
  • frequent cutaneous signs, rash, urticaria, Quincke's oedema
  • possible respiratory signs, dyspnoea or bronchospasm

– **Septic shock**
  • high fever, or rarely, hypothermia (< 36°C), rigors, confusion
  • in the initial phase the BP may be maintained, but rapidly follows the same pattern as for hypovolaemic shock

– **Cardiogenic shock**
  • Respiratory signs of left ventricular failure (acute pulmonary oedema) are dominant: tachypnoea, crepitations on ausculation
  • Signs of right ventricular failure: raised jugular venous pressure, hepatojugular reflux, sometimes alone, more often associated with signs of left ventricular failure

The **aetiological diagnosis** is oriented by:
– the context: trauma, insect bite, ongoing medical treatment etc.
– the clinical examination:
  • skin pinch consistent with dehydration
  • thoracic pain from a myocardial infarction or pulmonary embolus
  • abdominal pain or rigidity of the abdominal wall from peritonitis, abdominal distension from intestinal obstruction
  • bloody stool, vomiting blood
  • subcutaneous crepitations, likely anaerobic infection
  • fever

Treatment

Symptomatic and aetiological treatment must take place simultaneously.

All cases

– Emergency +++: immediate attention to the patient.
– Lay the patient flat, warm the patient, elevate legs (except in acute pulmonary oedema).
– Insert a peripheral IV line using a large calibre catheter (16G in adults).
– Oxygen therapy, assisted ventilation in the event of respiratory distress.
– Assisted ventilation and external cardiac compression in the event of cardiac arrest.
– Intensive monitoring of: consciousness, pulse, BP, respiratory rate, hourly urinary output (insert an urinary catheter) and skin mottling.

Specific causes

– **Haemorrhage**

- Control bleeding (compression, tourniquet, surgical haemostasis)
- Determine blood group
- Priority +++: restore vascular volume as quickly as possible
  Insert 2 peripheral IV lines using large calibre catheters (16G in adults) with **plasma substitute**: replace 1.5 times the estimated losses
  and/or
  Ringer Lactate or **0.9% sodium chloride**: replace 3 times the estimated losses
- Transfuse: classically once estimated blood loss represents approximately 40% of blood volume or if haematocrit is < 20%.
  First, verify blood group (as a default give O negative) and ensure screening for HIV, hepatitis B and C etc.
  In the absence of HIV and hepatitis B and C screening, see *Note*, page 35.

– **Acute dehydration**

Administer preferably **Ringer Lactate** or, if not available, **0.9% sodium chloride**.

For information:
Children under 1 year: 100 ml/kg over 6 hours according to the following protocol:
30 ml/kg the first hour followed by 70 ml/kg over the following 5 hours

Children over 1 year and adults: 100 mg/kg over 3 hours according to the following protocol:
30 ml/kg over 30 minutes followed by 70 ml/kg over the following 2 1/2 hours.

In practice, only reduce the IV rate once the patient has recovered pulse, BP and consciousness. Be careful to avoid fluid overload in young children and the elderly.

Note: in severely malnourished children the IV rate and solution are different than those for healthy children (see *Severe acute malnutrition*, page 37).

– **Anaphylactic shock**

- Determine the causal agent
- Stop any injections or infusions in course, but if in place, maintain the IV line
- **epinephrine** (**adrenaline**) is the treatment of choice:
  Children: dilute 0.25 mg in 9 ml of water for injection and inject by direct IV, ml by ml, until normal BP is reached and tachycardia is reduced.
  Adults: dilute 1 mg in 9 ml of water for injection and inject by direct IV ml by ml until a normal BP is reached and tachycardia is reduced.

  If it is impossible to find IV access, epinephrine may be given sublingually at the same doses as by IV. In less severe cases, it can also be given SC: 0.3 to 0.5 mg to be repeated every 5 to 10 minutes if necessary.

  In the event of persistent shock, administration of IV epinephrine at a constant rate by a syringe pump (see final box) may be necessary for 6 to 24 hours: 0.1 to 0.5 microgram/kg/minute according to the clinical evolution.
- Fluid replacement with **Ringer Lactate** or **0.9% sodium chloride**

- Corticosteroids have no effect in the acute phase. However, they must be given once the patient is stabilized to prevent recurrence in the short term
  hydrocortisone hemisuccinate IV or IM
  Children: 1 to 5 mg/kg/24 hours in 2 or 3 injections
  Adults: 200 mg every 4 hours
- In patients with bronchospasm: epinephrine is effective. If the spasm persists give 10 puffs of inhaled **salbutamol**.
- Special situation: to prevent placental vasoconstriction in pregnant women, first use high dose **ephedrine**: 25 to 50 mg IV. If there is no immediate improvement, use **epinephrine** (adrenaline) at the doses given above.

– **Septic shock**

- Vascular fluid replacement with **plasma substitute** or **Ringer Lactate** or **0.9 % sodium chloride**
- Use of vasoconstrictors:
  dopamine IV at a constant rate by syringe pump (see final box): 10 to 20 micrograms/kg/minute
  or, if not available
  epinephrine (**adrenaline**) IV at a constant rate by syringe pump (see final box): from 0.1 microgram/kg/minute. Increase the dose progressively until a clinical improvement is seen.
- Look for the origin of the infection (abscess; ENT, pulmonary, digestive, gynaecological or urological infection etc.)
- Antibiotic therapy according to the origin of infection:

Origin	Antibiotic therapy	Alternative
Cutaneous staphylococci, streptococci	cloxacillin + gentamicin	
Pulmonary pneumococci, *Haemophilus influenzae*	ampicillin or ceftriaxone +/- gentamicin	co-amoxiclav or ceftriaxone + ciprofloxacin
Intestinal or **biliary** enterobacteria, anaerobic bacteria, enterococci	co-amoxiclav + gentamicin	ceftriaxone + gentamicin + metronidazole
Gynaecological streptococci, gonococci, anaerobic bacteria, *E. coli*	co-amoxiclav + gentamicin	ceftriaxone + gentamicin + metronidazole
Urinary enterobacteria, enterococci	ampicillin + gentamicin	ceftriaxone + ciprofloxacin
Other or undetermined	ampicillin + gentamicin	ceftriaxone + ciprofloxacin

ampicillin IV
Children and adults: 150 to 200 mg/kg/day in 3 injections (every 8 hours)

cloxacillin IV
Children: 100 mg/kg/day in 3 injections (every 8 hours)
Adults: 3 g/day in 3 injections (every 8 hours)

co-amoxiclav (**amoxicillin** + **clavulanic acid**) slow IV
Children: 75 to 150 mg/kg/day in 3 injections (every 8 hours)
Adults: 3 g/day in 3 injections (every 8 hours)

ceftriaxone slow IV[1]
Children: 100 mg/kg as a single injection on the first day, then 50 mg/kg/day the following days
Adult: 2 g once daily

ciprofloxacin PO (by nasogastric tube)
Children: 15 to 30 mg/kg/day in 2 divided doses
Adult: 1500 mg/day in 2 divided doses

gentamicin IM
Children and adults: 3 to 6 mg/kg/day in 1 or 2 injections

metronidazole IV
Children: 20 to 30 mg/kg/day in 3 infusions (every 8 hours)
Adults: 1 to 1.5 g/day in 3 infusions (every 8 hours)

- Corticosteroids: not recommended, the adverse effects outweigh the benefits

– **Cardiogenic shock**

The objective is to restore efficient cardiac output. The treatment of cardiogenic shock depends on its mechanism.

- ***Acute left heart failure with pulmonary oedema***

  Acute pulmonary oedema (see *Heart failure in adults*, page 284).

  In the event of worsening signs with vascular collapse, use a strong inotrope:
  dopamine IV at a constant rate by syringe pump (see final box):
  3 to 10 micrograms/kg/minute
  Once the haemodynamic situation allows (normal BP, reduction in the signs of peripheral circulatory failure), nitrates or morphine may be cautiously introduced.

  Digoxin should no longer be used for cardiogenic shock, except in the rare cases when a supraventricular tachycardia has been diagnosed by ECG. Correct hypoxia before using digoxin.
  digoxin slow IV
  Children: one injection of 0.010 mg/kg (10 micrograms/kg), to be repeated up to 4 times/24 hours if necessary
  Adults: one injection of 0.25 to 0.5 mg, then 0.25 mg 3 or 4 times/24 hours if necessary

- ***Cardiac tamponade*:** restricted cardiac filling as a result of haemopericardium or pericarditis.
  Requires immediate pericardial tap after restoration of blood volume +++

[1] The solvent of ceftriaxone for IM injection contains lidocaine. Ceftriaxone reconstituted using this solvent must NEVER be administered by IV route. For IV administration, water for injection must always be used.

- ***Tension pneumothorax***: drainage of the pneumothorax
- ***Symptomatic pulmonary embolism***: treat with an anticoagulant in a hospital setting

The administration of **dopamine** or **epinephrine** (**adrenaline**) at a constant rate requires that certain conditions be met:
– medical supervision in a hospital setting
– exclusive use of one vein (no other infusion or injection by this vein), avoid using the brachial site;
– use of an electric syringe pump
– progressive increase and adaptation of doses depending on clinical evolution
– intensive monitoring of drug administration, particularly during syringe changes

Example:
dopamine: 10 micrograms/kg/minute in a patient weighing 60 kg
Hourly dose: 10 (micrograms) x 60 (kg) x 60 (minutes) = 36 000 micrograms/hour = 36 mg/hour
In a 50 ml syringe, dilute one 200 mg-ampoule of dopamine with 0.9% sodium chloride to make a volume of 50 ml. Final solution contains 4 mg dopamine/ml.
For a dose of 36 ml/hour, administer the solution (4 mg/ml) at 9 ml/hour.

If there is no electric syringe pump, dilution in an infusion bag may be considered. However, it is important to consider the risks involved with this type of administration (accidental bolus or insufficient dose). The infusion must be constantly monitored to prevent any, even small, change from the prescribed rate of administration.

Example:
epinephrine: 0.2 microgram/kg/minute in a 60 kg patient
Rate: 0.2 (microgram) x 60 (kg) = 12 micrograms/minute
Dilute 2 ampoules of 1 mg (2 x 1000 micrograms) of epinephrine in 250 ml of 0.9% sodium chloride to make a solution of 8 micrograms/ml.
For a dose of 12 micrograms/minute, administer 1.5 ml/minute (12 ÷ 8 = 1.5)
Knowing that 1 ml = 20 drops, administer 20 (drops) x 1.5 ml/1 (minute) = 30 drops per minute.

Seizure disorders

– Involuntary paroxysmal movements of cerebral origin, always accompanied by a loss of consciousness, sometimes by tongue biting and urinary incontinence. It is important to distinguish seizures from 'pseudo-seizures' (for example in hysteria or tetanus) during which there is no real loss of consciousness.
– 2 priorities: stop the seizures and determine the cause. In pregnant women, eclamptic seizures require specific medical and obstetrical care (see page 25).

Symptomatic treatment

During a seizure

– Protect from trauma, maintain airway, place patient in 'recovery position' (on his left side with right knee flexed), loosen clothing.
– **diazepam**
Children: 0.5 mg/kg preferably rectally[1] without exceeding 10 mg.
IV administration is possible only if a means of ventilation is available (0.3 mg/kg over 2 or 3 minutes).
Adults: 10 mg rectally (or only if a means of ventilation is available, by slow IV).
In all cases:
• Dilute 10 mg (2 ml) of diazepam in 8 ml of 5% glucose or 0.9% sodium chloride;
• Repeat dose once if convulsion continues after 5 minutes;
• If convulsion continues after the second dose, treat as status epilepticus.

The patient is no longer seizing

– Look for the cause of the seizure and evaluate the risk of recurrence.
– Prepare a syringe of diazepam in case the patient starts to seize again.

Status epilepticus

Several distinct seizures without complete restoration of consciousness in between or an uninterrupted seizure lasting more than 10 minutes.

– Protect from trauma, maintain airway, place patient in 'recovery position' (on his left side with right knee flexed), loosen clothing.
– Oxygen: 3 to 5 litres/minute
– Insert an IV line
– Systematic administration of **50 % glucose**: 10 ml slow direct IV
– After giving diazepam (see above), **phenobarbital** in an infusion of 5% glucose.
Children: 15 mg/kg at a maximum rate of 30 mg/minute
Adults: 10 to 15 mg/kg at a maximum rate of 100 mg/minute (maximum dose 1 g)
Once the seizures have stopped, reduce the infusion rate.
There is a risk of respiratory depression: monitor respiratory rate and papillary reaction (myosis in the event of an overdose). If the first dose is not effective, put the patient on ventilation before giving supplementary doses.

[1] For rectal administration, use a syringe without a needle, or better, cut a nasogastric tube, CH8, to a length of 2-3 cm and attach it to the tip of the syringe.

Aetiological treatment

– **Febrile seizures**
Determine the cause of the fever. Give **paracetamol** or **acetylsalicylic acid** PO (see *Fever*, page 26), undress the patient, wrap in damp cloth.
In children under 3 years, there is usually no risk of later complications after simple febrile seizures and no treatment is required after the crisis. For further febrile episodes, **paracetamol** PO: 60 mg/kg/day in 3 or 4 divided doses

– **Infectious causes**
Severe malaria (page 127), meningitis (page 159), meningo-encephalitis, cerebral toxoplasmosis (pages 206 and 207), cysticercosis (page 149) etc.

– **Metabolic causes**
  • Hypoglycaemia: **50 % glucose**, 1 ml/kg by slow, direct IV in all patients who do not regain consciousness, in the event of malaria and for newborns and malnourished children.
  • Hypocalcaemia (rickets, newborns):
  calcium gluconate (10 ml ampoule of 10% solution = 1 g)
  Newborns: 0.5 ml/kg by slow, direct IV injection (over 5 to 10 minutes)
  Children: 5 ml by slow, direct IV injection (over 5 to 10 minutes)
  Adults: 10 ml by slow, direct IV injection (over 5 to 10 minutes)

– **Iatrogenic causes**
Withdrawal of antiepileptic therapy in a patient being treated for epilepsy should be managed over a period of 4 to 6 months with progressive reduction of the doses. An abrupt stop of treatment may provoke severe repetitive seizures.

– **Epilepsy**
  • A single seizure or seizures linked to a cerebral injury (cranial trauma, cerebral vascular accident, drug or alcohol withdrawal) are not sufficient to lead to a diagnosis of epilepsy. Only patients chronically affected with repetitive spontaneous seizures require regular treatment with an antiepileptic over a period of years.
  • Once a diagnosis is made, abstention from treatment may be recommended due to the risks associated with treatment. However, these risks must be balanced with the risks of aggravation of the epilepsy and irreversible cognitive deficit if the patient is not treated.
  • It is always preferable to start with monotherapy. The effective dose must be reached progressively and symptoms and drug tolerance evaluated every 15 to 20 days.
  • An abrupt stop of treatment with antiepileptics may provoke status epilepticus. The rate of dose reduction varies according to the length of treatment; the longer the treatment period, the longer the reduction period (see *iatrogenic causes*, above). In the same way, a change from one antiepileptic drug to another must be made progressively with an overlap period of several weeks.
  • First line treatments for generalised tonic-clonic seizures (grand mal) are sodium valproate (active on all types of epilepsy) and phenobarbital. Second line treatments are carbamazepine[2] and phenytoin. For information:
  phenobarbital PO
  Children: 3 to 4 mg/kg/day at night, increase the dose progressively to 8 mg/kg/day if necessary
  Adults: 2 mg/kg/day at night (without exceeding 100 mg per day), increase the dose progressively to 6 mg/kg/day if necessary

2 Carbamazepine is the first line treatment for partial seizures and ethosuximide for absence (petit mal) seizures.

sodium valproate PO
Children over 20 kg: start with a dose of 400 mg in 2 divided doses irrespective of weight. If necessary, increase the dose progressively until the optimal dose for the individual has been reached (usually 20 to 30 mg/kg/day in 2 divided doses).
Adults: start with 600 mg/day in 2 divided doses. Increase by 200 mg/day every 3 days until the optimal dose for the individual has been reached (usually 1 to 2 g/day in 2 divided doses).
carbamazepine PO
Children: start with an initial dose of 2 mg/kg/day in 1 or 2 divided doses. Increase every week until the optimal dose for the individual has been reached (usually 10 to 20 mg/kg/day in 2 to 4 divided doses).
Adults: start with 200 mg/day in 1 or 2 divided doses. Increase by 200 mg every week until the optimal dose for the individual has been reached (usually 800 to 1200 mg/day in 2 to 4 divided doses).

Special situation: seizures during pregnancy

– **Eclampsia**: seizures during the third trimester of pregnancy, most commonly in the context of pre-eclampsia (hypertension, oedema and proteinuria on reagent-strip test).

  • Symptomatic treatment of eclampsia:
  Treatment of choice is **magnesium sulphate** by IV infusion: 4 g diluted in 0.9% sodium chloride over 15 to 20 minutes. If the seizure continues, give another 2 to 4 g without exceeding 8 g during the first hour. Then infuse 1 g/hour and continue the magnesium sulphate for 24 hours following delivery or the last seizure.
  Monitor urine output. Stop the treatment if urinary output is less than 30 ml/hour or 100 ml/4 hours.
  ⚠ Before each injection, verify the concentration written on the ampoules: there is a risk of potentially fatal overdose. Always have calcium gluconate ready to reverse the effects of magnesium sulphate in the event of toxicity.
  Monitor patellar tendon reflex every 15 minutes during the infusion. If the patient has malaise, drowsiness, difficulty speaking or loss of patellar reflex: stop the magnesium sulfate and inject 1 g of **calcium gluconate** by slow, direct IV injection (over 5 to 10 minutes).
  Only in the absence of magnesium sulfate, use **diazepam**: 10 mg slow IV followed by 40 mg in 500 ml 5% glucose as a continuous infusion over 24 hours. If there is no venous access for the loading dose, give 20 mg rectally. In the event of treatment failure after 10 minutes, give a second dose of 10 mg.
  For direct IV or rectal administration dilute diazepam in 5% glucose or 0.9% sodium chloride to make a total volume of 10 ml.

  • Oxygen: 4 to 6 litres/minute
  • Nursing, hydration +++ (1 litre **Ringer Lactate** rapidly)
  • Urgent delivery within 12 hours
  • Treatment of hypertension: see *Hypertension*, page 281

– **Other causes**: during pregnancy, consider that seizures may also be caused by cerebral malaria or meningitis (the incidence of these diseases is increased in pregnant women, see *Malaria*, page 127 and *Bacterial meningitis*, page 159).

Fever

– A frequent symptom, fever is often linked, but not exclusively, with infection. All clinical examinations should include checking for fever.
– Fever is defined as a temperature higher than 37.5°C axillary and 38°C if measured rectally. It is accepted that an axillary temperature underestimates the core body temperature by 0.5°C, but this is very approximate. Use an electronic thermometer when available. Temperature should be measured over a period of 5 minutes when using a mercury thermometer.
– In a febrile patient, first look for signs of serious illness, then try to establish a diagnosis.

Signs of serious illness

– Signs of sepsis with signs of shock: circulatory failure, respiratory distress, purpura, confusion, coma.
– Signs of a systemic illness: meningeal syndrome, seizures, heart murmur on auscultation, abdominal pain, rash etc.
– Signs related to an individual's general condition: malnutrition, immune suppression, splenectomy, chronic disease, the very young and the very old, bedridden patients.

Aetiology

Many different diseases, infectious or noninfectious, acute or chronic, benign or malignant, may be accompanied by fever. Among the infectious diseases requiring immediate treatment, look for:
– purpura fulminans
– bacterial meningitis (page 159)
– cerebral malaria (page 127)
– severe bacterial skin infections (page 100)
– acute pyelonephritis with urinary retention (page 216)
– peritonitis or gastrointestinal infection
– pneumonia with signs of respiratory distress (page 63)
– acute endocarditis (page 287)
– subglottic or epiglottic laryngitis (page 49)

In the absence of signs of serious illness and obvious diagnosis, patients may return home with an antipyretic, dietary advice (plenty of fluids) and educated to look for the appearance of new signs. Patients should return for a new consultation if there is no improvement or if their condition deteriorates within 48 hours of the initial consultation. In certain situations (geographical distance, problems of transport, doubts about the quality of surveillance) it may be better to keep patients for observation even if the general condition would not require hospitalisation.

Complications

– Convulsions
– Dehydration
– Confusion, delirium

It is important, particularly in children, to look for signs of these complications, to treat them, and most importantly to prevent them.

Treatment

– ***Treatment of the cause***: according to the aetiology of the fever

– ***Symptomatic treatment***

- Undress the patient; wrap in a damp cloth or bathe for a few minutes in water at 37°C
- Drug therapy:
  paracetamol PO
  Children: 60 mg/kg/day in 3 or 4 divided doses
  Adults: 3 to 4 g/day in 3 or 4 divided doses
  or
  acetylsalicylic acid PO
  Children: 60 mg/kg/day in 3 or 4 divided doses
  Adult: 1 to 3 g/day in 3 or 4 divided doses

Doses of paracetamol and acetylsalicylic acid (A.S.A.) according to age and weight

AGE	0	2 months	1 year	5 years	15 years ADULT
WEIGHT		**4 kg**	**8 kg**	**15 kg**	**35 kg**
paracetamol					
100 mg tablet	1/2 tab x 3	3/4 à 1 1/2 tab x 3	1 1/2 to 3 tab x 3		
500 mg tablet			1/4 to 1/2 tab x 3	1/2 to 1 1/2 tab x 3	2 tab x 3
A.S.A.					
75 mg tablet			2 tab x 3		
100 mg tablet			1 1/2 tab x 3	3 tab x 3	
300 mg tablet			1/2 tab x 3	1 tab x 3	2 tab x 3
500 mg tablet			1/4 tab x 3	1/2 tab x 3	1 tab x 3

- Properly hydrate the patient
- Continue to feed, even if a child has little appetite. The mother must be persuaded of the importance of feeding and of continuing to breastfeed (+++).
- In the event of a febrile seizure:
  diazepam
  Children: 0.5 mg/kg preferably rectally[1] without exceeding 10 mg.
  IV administration is possible only if a means of ventilation is available (0.3 mg/kg over 2 or 3 minutes).
  Repeat dose once if seizure continues for more than 5 minutes.
  For rectal or IV administration, dilute 10 mg (2 ml) of diazepam in 8 ml of 5% glucose or 0.9% sodium chloride.

Notes:
– In certain countries, acetylsalicylic acid is contra-indicated for children. Paracetamol is preferred when available.
– Paracetamol has no anti-inflammatory properties.
– Paracetamol is the first choice treatment in patients allergic to acetylsalicylic acid, children, pregnant women, and patients with a history of or currently suffering from ulcers or other gastric problems.

[1] For rectal administration, use a syringe without a needle, or better, cut a nasogastric tube, CH8, to a length of 2-3 cm and attach it to the tip of the syringe.

Pain

Pain is a common reason for medical consultation and results from a variety of pathological processes. Pain is a subjective sensation which is expressed differently by each patient depending on their cultural background, age, etc. A thorough evaluation will, in most cases, determine the cause of pain. The notions of acute and chronic pain are fundamental as they lead to different patient management. It is essential that both types of pain are treated.

Clinical signs

– **Pain assessment**

- intensity: regular assessment of the intensity of pain is indispensable in establishing effective treatment. Use a self-assessment scale (verbal, visual analog or numeric)[1].
- onset: sudden, sub-acute or chronic; at rest, at night, on movement
- location: head, thorax, abdomen, lumbar region, joints etc.
- type: burning, cramping, radiating, spasmodic
- aggravating factors, relieving factors

– **Clinical examination**

- of the organ or area where the pain is localized
- signs of underlying disease (cough, diarrhoea, vomiting, burning sensation on urination etc.) and review all systems
- associated signs (fever, weight loss etc.)

– **Synthesis**

The synthesis of information collected during history taking and clinical examination allows aetiological diagnosis and orients treatment. It is important to distinguish:

- *Nociceptive pain* due to excess stimulation: most often acute pain, the cause-effect relation is obvious. The pain may assume different forms, but neurological exam is normal (eg. acute post-operative pain, burns, trauma, renal colic etc.). Treatment is relatively well standardized.

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1 **Self-assessment scales** allow the measurement of the intensity of pain and estimation of the treatment response in a simple and reproducible way.
Simple verbal scale: pain is quantified in words.
0: no pain; 1: mild pain; 2: moderate pain; 3: severe pain; 4: extreme pain
Visual analog scale: pain is measured with the help of a small ruler. On one side of the ruler there is a pointer that the patient slides along an approximately 10 cm line. The left end of the line is marked as 'no pain' and the right end as 'worst pain imaginable'. On the other side of the ruler is a graduated scale for the healthcare provider. On this scale each position of the marker corresponds to a number between 0 and 10.
Numeric scale: pain is quantified as a number between 0 and 10. 0 corresponding to 'no pain' and 10 corresponding to 'the worst pain imaginable'.

- *Neuropathic pain* due to a lesion of the nervous system (section, traction, ischaemia): most often chronic pain. Sometimes on a base of constant, more or less localized pain, such as paraesthesia or burning, there are recurrent acute crises of pain such as electrical charges, frequently associated with neurological disorders (anaesthesia, hypo or hyperaesthesia). This type of pain is linked with viral infections directly affecting the CNS (herpes simplex, herpes zoster), neural compression by tumors, post-amputation pain (phantom pain), paraplegia etc.
- *Mixed pain* (cancer, HIV) treatment will require a broader approach.
- *Psychogenic pain* is only considered when all functional causes have been eliminated: usually responds to treatment of underlying psychiatric disease (hypochondria, masked depression etc.).

Treatment

Treatment depends on the nature and intensity of the pain. It is at the same time aetiological and symptomatic if a curable cause is identified. Treatment is symptomatic in other cases (no cause found, non-curable disease).

Nociceptive pain

The WHO classifies analgesics used for nociceptive pain on a three step analgesic ladder according to the intensity of pain to be treated:
– **Step 1**: non opioid analgesics: paracetamol and nonsteroidal anti-inflammatory drugs (NSAIDs), including aspirin. For mild pain, from 0 to 3 on the pain scale.
– **Step 2**: weak opioid analgesics: codeine, dextropropoxyphene and tramadol. Their effect is increased when associated with a Step 1 analgesic. For moderate pain, from 4 to 6 on the pain scale.
– **Step 3**: strong opioid analgesics: morphine and its derivatives. For severe pain, above 6 on the pain scale.

Use is based on a few fundamental concepts:
– oral forms are preferred
– systematic administration at fixed time intervals (not on demand)
– combination of analgesics
– adapt step and dose of analgesic according to the intensity of the pain (use self-assessment scale)
  - Start with a **Step 1** analgesic, if necessary increase dose to the maximum recommended. A combination of paracetamol + NSAID is more effective than either paracetamol or NSAID alone.
  - If treatment is insufficient, do not change to another analgesic of the same step. Without delay, add a **Step 2** analgesic to paracetamol or the combination of paracetamol + NSAID.
  - If treatment is still insufficient, replace, without delay, the Step 2 analgesic with one of **Step 3**.
  - In the case of acute, severe pain, start with an analgesic of the level presumed most effective (eg. start with a Step 3 analgesic in the event of a fractured femur).
– The treatment and dose chosen are guided by the patient's response which may vary significantly from one person to another.
– Apart from incapacitated patients, only the individual is able to assess his/her level of pain.

Level	Analgesic	Children	Adults (for pregnant women, cf. next page)	Remarks
1	**paracetamol** PO	60 mg/kg/day in 3 to 4 divided doses	3 to 4 g/day in 3 to 4 divided doses	
	acetylsalicylic acid PO	60 mg/kg/day in 3 or 4 divided doses	1 to 3 g/day in 3 or 4 divided doses	
	diclofenac PO or IM	PO only: 2 to 3 mg/kg/day in 3 divided doses	IM: 75 mg once daily (max. 150 mg/day) for 2 days followed by PO: 150 mg/day in 3 divided doses	Respect contra-indications: gastroduodenal ulcer, non corrected hypovolaemia or dehydration, severe malnutrition, renal failure, patient > 60 kg. Treatment must be as short as possible.
	indometacin PO	Do not use in children under 15 years	50 to 150 mg/day in 3 divided doses	
	ibuprofen PO	Children over 6 months: 20 to 30 mg/kg/day in 3 to 4 divided doses	1200 mg/day in 3 divided doses	
2	**codeine** PO	Children over 1 year: 0.5 mg/kg, 3 to 6 times daily	30 to 60 mg, every 4 to 6 hours	
	dextropropoxyphene PO	Contra-indicated in children under 15 years	65 mg, every 6 to 8 hours	
	tramadol PO	Children over 1 year: 1 to 2 mg/kg, every 6 to 8 hours	50 to 100 mg, every 4 to 6 hours, do not exceed 400 mg/day	Progressive increase of dose reduces nausea and vomiting.
	tramadol SC, IM, slow IV	Children over 1 year: 1 to 2 mg/kg, every 6 to 8 hours	50 to 100 mg, every 4 to 6 hours, do not exceed 600 mg/day	
3	**morphine** PO, slow release	Children over 6 months: 1 mg/kg/day in 2 divided doses	60 mg/day in 2 divided doses	
	morphine PO, immediate release	Children over 6 months: 1 mg/kg/day in 6 divided doses	60 mg/day in 6 divided doses	
	morphine SC, IM	Children over 6 months: 0.1 to 0.2 mg/kg, every 4 hours	0.1 to 0.2 mg/kg, every 4 hours	
	pethidine SC, IM or IV	IM: 0.5 to 2 mg/kg, to be repeated after 4 hours if necessary	IM, SC: 25 to 100 mg or slow IV: 25 to 50 mg to be repeated after 4 hours if necessary	Avoid use for chronic pain.
	nalbuphine SC, IM or IV	0.2 to 0.3 mg/kg, every 4 to 6 hours	10 to 20 mg, every 4 to 6 hours	
	pentazocine SC, IM or slow IV	Children over 3 years: SC or IM: 1 mg/kg, every 3 to 4 hours slow IV: 0.5 mg/kg, every 3 to 4 hours	30 to 60 mg, every 3 to 4 hours	
	buprenorphine SC	Children over 6 months: 3 to 6 micrograms/kg, to be repeated after 6 to 8 hours	0.3 to 0.6 mg, to be repeated after 6 to 8 hours For chronic pain: 0.3 mg, every 12 hours	Respiratory depression is poorly reversed by nalaxone.

Notes on the use of morphine and other opioids:

– Morphine is an effective treatment for many types of pain. Its adverse effects have often been exaggerated and should not be an obstacle to its use.

– The most serious adverse effect of morphine is respiratory depression, which may be fatal. This adverse effect is rare and results from overdosage. It is, therefore, important to increase doses progressively. Respiratory depression is preceded by drowsiness which is a warning to monitor respiratory rate. The respiratory rate should remain above 10 per minute. A patient with respiratory depression should be vigorously stimulated, either verbally or physically. If insufficient, use naloxone to reverse the respiratory effect. In this event, the analgesic effects will also be reversed.

– For chronic pain in late stage disease, it may be necessary to increase doses over time (cancer, AIDS etc.). Do not hesitate to give sufficient and effective doses.

– Morphine always provokes constipation. For all treatments ≥ 48 hours, administer systematically:
  • an osmotic laxative (**lactulose 66.5%**: children < 1 year: 5 ml/day; children from 1 to 6 years: 5 to 10 ml/day; children from 7 to 14 years: 10 ml/day; adults: 10 to 25 ml/day),
  • in combination with a stimulant laxative in children over 6 years and adults (**bisacodyl**: children > 6 years: 5 mg/day; adults: 10 mg/day).

– Nausea and vomiting are common at the beginning of treatment, give **metoclopramide** (children: 5 to 15 mg/day in 3 divided doses, adults: 15 to 30 mg/day in 3 divided doses).

– For morphine and pethidine, the analgesic effect is dose-dependent. Buprenorphine, nalbuphine and pentazocine each have a ceiling effect. It is ineffective, and possibly harmful (increase in adverse effects) to give more than the maximum dose recommended: the analgesic effect will not increase.

– Buprenorphine, nalbuphine and pentazocine must not be combined with morphine, pethidine, tramadol, dextropropoxyphene or codeine because they have competitive action.

Treatment of nociceptive pain in pregnant women

Pain level	Mild to moderate pain			Moderate pain	Severe pain
	paracetamol	**aspirin**	**ibuprofen**	**codeine**	**morphine**
1st trimester	first choice	avoid	avoid	possible	possible
2nd trimester	first choice	avoid	avoid	possible	possible
3rd trimester	first choice	contra-indicated	contra-indicated	possible, but short period*	possible, but short period*
Term	first choice	contra-indicated	contra-indicated	possible, but short period* (risk of withdrawal syndrome in the newborn)	possible, but short period* (withdrawal syndrome and respiratory depression in the newborn: monitor +++)

* if possible do not exceed a treatment period of 10 days

Neuropathic pain

The common analgesics and anti-inflammatory drugs are often ineffective in treating this type of pain.

Treatment of neuropathic pain is based on centrally acting drugs:

– **amitriptyline** when the pain is continuous. Adults: start with a dose of 10 to 25 mg/day at night and increase progressively to reach an effective dose, without exceeding 150 mg/day. Reduce the dose by 1/2 in elderly patients.
– **carbamazepine** is effective in treating the searing or dagger like components of neuropathic pain. Adults: start with a dose of 200 mg once daily at night for one week, then 400 mg/day in 2 divided doses (morning and night) for one week, then 600 mg/day in 3 divided doses.

Mixed pain

In mixed pain with a significant component of nociceptive pain, such as in cancer or AIDS, oral morphine is the drug of choice when medications of lower steps have been proved insufficient. Morphine can be combined with antidepressants and antiepileptics for neuropathic pain.

Chronic pain

In contrast to acute pain, medical treatment alone is not always sufficient in controlling chronic pain. A multidisciplinary approach including physiotherapy, psychotherapy and nursing is often necessary to allow good pain relief and encourage patient self-management.

Co-analgesics

The combination of certain drugs may be useful or even essential in the treatment of pain: antidepressants, antiepileptics, muscle relaxants, anxiolytics, antispasmodics, corticosteroids, local anaesthesia, etc.

Note: bone pain or osteoarticular pain may be caused by a vitamin C deficiency (see page 89).

Fatigue

Fatigue is one of the most common reasons for medical consultation. The term includes various subjective senses (lassitude, lack of energy etc.). Many disorders begin with fatigue. Organic fatigue is differentiated from psychiatric fatigue (depression, anxiety, post traumatic stress disorder) and reactional fatigue (isolated).

Clinical signs

The clinical examination must define:

– *The context of onset*: progressive or abrupt, long-standing or recent, isolated or associated with other signs, or linked with particular situations (work, intense activity, travel, illness).

– *The nature of the fatigue*: physical, intellectual, sexual; does it happen in the morning (usually of psychological origin) or is it most common in the evening (more likely of physical origin).

– *Associated clinical signs*:
  • the presence of associated general signs (loss of appetite, weight loss, fever) leads to a probable organic cause;
  • the association of clinical signs corresponding to a specific syndrome defines the aetiology: haemoptysis and cough with tuberculosis; dyspnoea with heart failure; anaemia and abdominal pain with parasite infections; jaundice with hepatitis etc.;
  • in a patient with associated signs of difficulty sleeping, anorexia, behavioural problems, sadness and slowed thoughts and reactions, think of a depressive episode.

The clinical examination includes:
– nutritional status: weight, signs of vitamin deficiencies, anaemia etc.
– cardiovascular system: BP, pulse, pulmonary auscultation
– digestive system
– spleen, liver, lymph nodes
– mucous membranes and skin
– psychological state (anxiety, depression)

Treatment

– *Fatigue linked to a syndrome*: treat the cause whether it is organic or psychiatric.

– *Isolated fatigue* is often a manifestation of problems related to personal issues, relationships etc. Taking the time to listen may help relieve the patient.

Anaemia

– Anaemia is defined as a haemoglobin level below reference values[1]. It is a frequent symptom in tropical settings where 10 to 20 % of the population present with Hb levels less than 10 g/dl.

– Anaemia is caused by:
  - *decreased production of red blood cells*: nutritional iron and/or folic acid deficiency, depressed bone marrow function, some infections (HIV, visceral leishmaniasis etc.);
  - *loss of red blood cells*: acute or chronic haemorrhage (ancylostomiasis etc.)
  - *increased destruction of red blood cells (haemolysis)*: malaria; infections or the intolerance of certain drugs by patients with G6PD deficiency (primaquine, dapsone, cotrimoxazole, nalidixic acid, nitrofuran derivatives etc.); haemoglobinopathies (sickle cell disease, thalassaemias); certain bacterial and viral infections (HIV).

– In tropical settings, the causes are often interlinked, the two most common causes are nutritional deficiencies and malaria. The groups most at risk are children and young women, particularly during pregnancy.

– Anaemia in itself is not an indication for transfusion. Most anaemias are well tolerated and can be corrected with simple aetiological treatment.

Clinical signs

– Common signs of anaemia: pallor of the conjunctivae, mucous membranes, palms of hands and soles of feet; fatigue, dizziness, oedema in the lower limbs, dyspnoea, tachycardia, heart murmur.

– Signs that anaemia may be immediately life threatening: sweating, thirst, cold extremities, tachycardia, respiratory distress and shock.

– Look for signs of a specific pathology: cheilosis, nutritional deficiency glossitis, haemolytic jaundice, signs of malaria (see page 127) etc.

Laboratory

– Haemoglobin level (or if haemoglobin is not available, haematocrit)

– Thick and thin blood films or rapid test if malaria is suspected

[1] Normal values : > 13 g/dl in men; > 12 g/dl in women ; > 11 g/dl in pregnant women; > 13.5 g/dl in newborns; > 9.5 g/dl in infants from 2 to 6 months; > 11 g/dl in children from 6 months to 6 years; > 11.5 g/dl in children from 6 to 12 years.

Treatment

Iron deficiency anaemia

– **elemental iron** PO
Children: 3 to 6 mg/kg/day in 2 or 3 divided doses for a minimum of 2 months
Adults: 120 to 180 mg/day in 2 or 3 divided doses for a minimum of 2 months

or preferably, give a combination of **elemental iron** (65 mg) + **folic acid** (0.40 mg) PO[2].

– Combine with an anthelminthic
albendazole PO (except during the 1st trimester of pregnancy)
Children from 1 to 2 years: 200 mg as a single dose
Children over 2 years and adults: 400 mg as a single dose
or
mebendazole PO (except during the 1st trimester of pregnancy)
Children over 1 year and adults: 500 mg as a single dose

Folic acid deficiency anaemia (rarely isolated)

– **folic acid** PO
Children under 1 year: 0.5 mg/kg once daily for 4 months
Children over 1 year and adults: 5 mg once daily for 4 months

Haemolytic anaemia

– Malaria: iron is ineffective except in patients with an associated iron deficiency. Give **folic acid** PO as above. For the treatment of malaria, see page 127.

– G6PD deficiency: no specific treatment; early treatment of infections; stop any drugs suspected to be causing a reaction.

Immediately life threatening anaemia

– Oxygen, particularly for children.

– Transfusion after determination of blood group and type and screening for HIV, hepatitis B and C, syphilis, malaria in endemic areas. To determine the blood volume required and the rate of transfusion, see next page.

***Note*: the current prevalence of HIV infection makes screening of donors vital. If there is no possibility of screening, it is up to the physician to weigh the transfusion risk with the life or death risk of not transfusing the patient. All transfusions that are not strictly indicated are strictly contra-indicated.**

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2 Doses are calculated in elemental iron.
Tablets of 200 mg ferrous sulphate such as those of ferrous sulphate + folic acid contain 65 mg of elemental iron.
300 mg tablets of ferrous gluconate contain 35 mg of elemental iron.

Adults	
Determine the *volume* of whole blood to be transfused: V = (haemoglobin required **minus** patient's haemoglobin) **multiplied** by 6 **multiplied** by patient's weight	Example: haemoglobin required = 7 g/dl patient's haemoglobin = 4 g/dl patient's weight = 60 kg Volume in ml = (7 – 4) x 6 x 60 = 1080 ml
Determine the *transfusion rate*: (1 ml of whole blood = 15 drops)	Example: 1080 ml to be administered over 3 hours 1080 (ml) ÷ 108 (minutes) = 6 ml/minute 6 (ml) x 15 (drops) = 90 drops/minute
Children	
Newborns and children under 1 year: 15 ml/kg over 3 to 4 hours Children over 1 year: 20 ml/kg over 3 to 4 hours Malnourished children: 10 ml/kg over 3 hours	Example: a malnourished child weighing 25 kg 10 (ml) x 25 (kg) = 250 ml over 3 hours 250 (ml) ÷ 180 (minutes) = 1.4 ml/minute 1.4 (ml) x 15 (drops) = 21 drops/minute

Monitor vital signs (pulse, blood pressure, respiratory rate, temperature) and watch for clinical signs of transfusion reactions.

In some cases, particularly in children suffering from severe malaria, anaemia may cause heart failure which may be decompensated by transfusion. If signs of hypervolaemia are seen: **furosemide** slow, direct IV: 1 mg/kg without exceeding 20 mg/kg.

– If present, treat any pulmonary or parasitic infection (malaria).

Prevention

– Iron or folic acid deficiency:
  • drug supplements (pregnant women, malnourished children); **elemental iron** (65 mg) + **folic acid** (0.40 mg) PO
  Children: 1 to 2 mg elemental iron/kg once daily for 1 to 2 weeks, treatment to be repeated multiple times during the year
  Pregnant women: 60 to 120 mg elemental iron/day in 2 divided doses for the second half of pregnancy until delivery
  • Nutritional supplements if the basic diet is insufficient
– For patients with sickle cell disease: long term treatment with **folic acid** PO: 5 mg/day.
– Early treatment of malaria, helminthic infections etc.

Severe acute malnutrition

– Severe acute malnutrition is caused by a significant imbalance between nutritional intake and individual needs. It is most often caused by both quantitative (number of kilocalories/day) and qualitative (fats, proteins, vitamins and minerals) deficiencies.
– As well as the clinical signs described below, severe acute malnutrition provokes severe physiological disorders (metabolic disturbances, anaemia, compromised immunity) and has a high mortality rate, particularly in the absence of medical care.
– The organization of care will depend on the number of patients to treat and will take place either in a pre-existing hospital structure or a specific structure (therapeutic feeding centre).

Children over 6 months of age

There are many causes of malnutrition: famine, food shortage, infection, poor weaning practices.

Clinical signs

Marasmus	– muscle wasting and loss of sub-cutaneous fat – no skin lesions – loss of appetite – child alert and irritable
Kwashiorkor	– bilateral pitting oedema of the lower limbs; oedema in the face in severe cases – skin lesions (skin smooth and shiny over areas with oedema, blistered, burned appearance; changes in pigmentation) – hair discoloured and brittle – loss of appetite – apathy
Marasmic-kwashiorkor	– muscle wasting and oedema

Classification

The main anthropometric indices that describe the nutritional status of an individual are:

Weight-for-height (W/H) allows a comparison between the weight of a malnourished child with the median weight of a non-malnourished child of the same height.[1] It reflects recent weight loss and allows a measure of the significance of weight loss. W/H is expressed in % of the median. In severe acute malnutrition W/H is < 70% of the median.

[1] Reference table weight/height for boys and girls expressed in % of the median (references NCHS/CDC/WHO).

Weight-for-age and *height-for-age* are used in other contexts.

Mid Upper Arm Circumference (MUAC) measures the circumference of the arm (the measurement is taken in the middle of a relaxed left upper arm in children of 12 to 59 months). A MUAC < 11 cm indicates severe acute malnutrition and a high risk of death.

All children with *bilateral lower limb oedema* suffer from severe acute malnutrition (kwashiorkor) irrespective of their W/H index (exclude other causes of oedema such as nephrotic syndrome).

W/H index, presence of bilateral oedema or MUAC measure the severity of malnutrition and are used as admission or discharge criteria for nutritional treatment programmes:

– usual admission criteria: W/H < 70% of the median, or bilateral lower limb oedema or MUAC < 11 cm. The overall condition of the child and the presence of infections should also be taken into account.
– usual discharge criteria (cure): W/H ≥ 85% of the median on two consecutive measurements taken at a 1 week interval, weight increasing, improvement in overall condition and complete disappearance of oedema.

Treatment

Treatment is organized in 2 phases and is both nutritional and medical. Care involves the participation of the mother under the supervision of trained health staff.

Phase 1: initial phase

The objective of phase 1 is to restore the metabolic function and not to increase weight. In children with kwashiorkor, the objective is the disappearance of oedema.

Recovery of normal nutritional status is progressive and not aggressive. Many small meals are given, spread out over 24 hours to reduce the risk of hypoglycaemia, hypothermia, diarrhoea, vomiting and heart failure linked with electrolyte imbalance. Children are fed with a spoon, never with a bottle.

If anorexia, repetitive vomiting or significant stomatitis prevent the child from eating, use a nasogastric tube for a maximum of 3 to 4 days (change the tube every 48 hours), under the supervision of qualified personnel.

Encourage mothers to continue breastfeeding.

Protocol: the diet must be low in protein (3 g/kg/day) and provide 100 kcal/kg/day divided in 8 meals of therapeutic milk with at least one meal given during the night.
Use therapeutic milk F75 (one bag of 410 g + 2 litres of water = 0.75 kcal/ml) or if not available, therapeutic milk F100 *specially diluted to be equivalent to the composition of F75* (one 456 g bag of F100 + 2.8 litres of water = 0.75 kcal/ml).
If therapeutic milk F75 and F100 are not available, prepare a High Energy Milk (HEM) as described in the table, page 39.

Note: for treatment of malnourished children under 6 months of age, refer to the MSF handbook, *Nutrition*.

Fluid requirements: it is important to offer drinking water between meals, particularly if the weather is hot or if a child has a fever.

Criteria for transfer to the nutritional rehabilitation phase (Phase 2)
The length of phase 1 depends on the clinical evolution. Children should never remain in phase 1 for more than 7 days. Transfer to phase 2 takes place once:
– medical complications are controlled,
– in children with kwashiorkor, oedema has completely disappeared or oedema has at least diminished after 7 days of treatment,
– the child regains appetite.

Note: when the situation allows, a transition phase can be organized between phase 1 and phase 2. It allows monitoring of the child's adaptation to an increased food ration (F100: 150 kcal/kg/day). During this phase, which should not be more than 3 days, evolution of oedema, possible appearance of signs of overhydration and cardiac decompensation are monitored.

Phase 2: nutritional rehabilitation

The objective is for the child to recover normal weight by eating an enriched diet, high in energy and balanced in protein. This phase may be organized as a day care centre.

Protocol: a minimum of 200 kcal/kg/day and 5 g of protein/kg/day should be provided. The meals are made up of therapeutic milk F100 (one bag of 456 g + 2 litres of water = 1 kcal/ml), high energy porridge and local foods. If not available, prepare a High Energy Milk (HEM) made of the following ingredients:

Preparation of dry mixture for one litre of high energy milk (HEM)

Ingredients	Grams	Protein (g)	Kcal
Skim milk powder	80	28.8	285
Vegetable oil	60	-	530
Sugar	50	-	200
CMV*	3	-	-
Total**	1 litre	28.8	1 015

* CMV: vitamin and mineral complex
** Water is added to make a volume of one litre

Fluid requirements: it is important to give drinking water between meals, particularly if the weather is hot or if a child has a fever.

Medical treatment

There are many complications caused by malnutrition that may be life threatening. Medical care is therefore extremely important and is initiated at the same time as nutritional care. The presence of trained medical staff is indispensable.

Associated pathologies and complications

Look for complications during a thorough medical examination on admission and during regular medical check-ups during hospitalisation.

Diarrhoea and dehydration

Diarrhoea is often associated with malnutrition; however, it is more difficult to evaluate the resulting degree of dehydration in malnourished children than in healthy children (see *Assessment of diarrhoeal patients for dehydration*, WHO, annex 2a, page 331).

– Treatment of dehydration:
  • Rehydration is oral (if necessary by nasogastric tube). Use special **oral rehydration salts** designed for severely malnourished children (**ReSoMal**), containing less sodium and more potassium than standard oral rehydration salts.
  Give under medical supervision: 10 ml/kg/hour over the first 2 hours followed by 5 ml/kg/hour until the signs of dehydration have disappeared.
  • IV administration carries a significant risk of fluid overload and heart failure. It is only used in case of hypovolaemic shock:
  Use **half strength Darrow's** solution or **Ringer Lactate**: 15 ml/kg over one hour to be administered under close medical supervision. Every 15 minutes, monitor clinical evolution and check for signs of overhydration.
    - If the patient improves after one hour (reduced respiratory rate, stronger radial pulse), continue IV infusion at the rate of 15 ml/kg over one hour then change to oral treatment with **ReSoMal**: 10 ml/kg/hour for up to 10 hours.
    - If there is no improvement after the first hour, assume that the patient has septic shock, maintain IV infusion (4 ml/kg/hour) and treat accordingly.

– Prevention of dehydration:
  Children with diarrhoea: give **ReSoMal** after each loose stool
  Children under 2 years: 50 to 100 ml after each loose stool
  Children over 2 years: 100 to 200 ml after each loose stool

– Treat the cause of diarrhoea if necessary (page 79).

Infections

Infections are common, but often difficult to detect (absence of fever).

– Prevention of measles by vaccination is a priority on admission.

– Bacterial infections: systematic antibiotic treatment on admission, even if there are no clinical signs of infection:
  amoxicillin PO: 60 to 100 mg/kg/day in 2 divided doses for 5 days
  If there are specific signs of infection: treat accordingly.

– Malaria: thick film or rapid test on admission, treat according to test results. In the absence of tests in endemic zones, treat systematically (page 127).

– Intestinal parasites: on the 7th day treat systematically with an anthelminthic:
  albendazole PO
  Children from 1 to 2 years: 200 mg as a single dose
  Children over 2 years: 400 mg as a single dose
  or, failing that, **mebendazole** PO
  Children over 1 year: 500 mg as a single dose

– Oral candidiasis: check all children, treat if necessary (page 88).

If even with good medical and nutritional care the child does not recover, consider other pathologies: tuberculosis, HIV infection etc.

Hypothermia and hypoglycaemia

These are two of the most frequent causes of death in the first days of hospitalisation. To prevent these complications:
– Give small meals, including during the night
– Cover children, monitor temperature twice daily during phase 1
– Treat underlying infections

Skin lesions from kwashiorkor

– Dry patches: apply **zinc oxide** ointment 2 times/day
– Erosions: disinfect with **chlorhexidine** + **cetrimide** 2 times/day
– Oozing or extensive lesions: apply **gentian violet** 2 times/day to dry the area. Avoid using gentian violet on the face.
– Secondary infections: treat as impetigo (page 100).

Micronutrient deficiencies

It is important to systematically correct vitamin and mineral deficiencies. The use of CMV enriched therapeutic milk corrects most of these deficiencies. However, some other supplements are still necessary:

– **folic acid**: systematic treatment: a single dose of 5 mg on admission.
Follow with curative treatment only for patients with anaemia (page 34).
Do not give folic acid for one week following administration of sulfadoxine + pyramethamine or cotrimoxazole.

– **elemental iron**[2]: only from the 14th day for all patients, with or without anaemia
3 mg/kg/day as a single dose for the duration of stay in the nutritional centre (this corresponds to ferrous sulphate 10 mg/kg/day)

– **retinol** (**vitamin A**): systematic treatment
Children from 6 months to 1 year (< 8 kg): 100 000 IU on Day 1
Children over 1 year (> 8 kg): 200 000 IU on Day 1

Phases of treatment of severe acute malnutrition in children > 6 months

Objectives	Treatment	Duration
PHASE 1 - 24 hour care		
Restore metabolic function	100 kcal/kg/day; 8 meals/day	1-7 days
Start medical treatment and prevent complications	Systematic treatment and specific prescriptions	
TRANSITION PHASE (optional) Increase food intake under supervision	150 kcal/kg/day; 8 meals/day	2-3 days
PHASE 2 - Day care		
Nutritional rehabilitation with increased food intake	> 200 kcal/kg/day; 6 meals/day	± 14 days
Continue medical treatment	Systematic treatment and specific prescriptions	
Social reintegration	Diversification of diet, psychological stimulation	

[2] Doses are indicated in elemental iron. One tablet of 200 mg ferrous sulphate contains 65 mg of elemental iron.

Monitoring and follow-up

The personnel responsible for the care of malnourished children must know how to identify a child whose condition is deteriorating and react accordingly.

The individual patient chart allows one to follow the evolution of the child. Phase 1 includes daily monitoring of food intake, weight gain, evolution of oedema, temperature and medical examination. During phase 2, the monitoring is the same, but the child is weighed every 2 to 3 days if they are regularly gaining weight.

Follow-up is organized after discharge from a nutritional centre: nutritional status and medical follow-up either in a supplementary feeding programme (preferably daycare) or through Mother Child Health consultations depending on the operational possibilities and context.

Adolescents and adults

Malnutrition in adolescents and adults is seen during famines or as a consequence of certain diseases (tuberculosis, AIDS, trypanosomiasis, visceral leishmaniasis etc.).

Clinical examination of the patient (sudden weight loss, loss of mobility from muscle wasting, cachexia, bilateral lower limb oedema in the absence of other causes of oedema) is indispensible for the diagnosis and adapted medical, nutritional and even social care of the patient.

It can be helpful to use certain indices to identify an increased risk of death linked to nutritional status: for adolescents, use W/H; for adults, use MUAC.

Admission criteria for therapeutic feeding centre (for information):

Adolescents	W/H < 70 % of the median (take clinical status into account)
Adults	MUAC < 16 cm irrespective of clinical status or MUAC < 18.5 cm + one of the following clinical signs: • Oedema of the lower limbs • Inability to stay standing • Visible dehydration In the elderly, the MUAC threshold is reduced by 1 cm.

Nutrition

Treatment follows the same principles as for children, but the calorie intake is lower:

	Phase 1 (F100 therapeutic milk)	**Phase 2**
Adolescents	55 kcal/kg/day	100 kcal/kg/day
Adults, including the elderly	40 kcal/kg/day	80 kcal/kg/day

Medical

– Treat underlying and associated diseases.
– Systematic treatment with:
  • **elemental iron**[3] only from the 14th day for all patients, with or without anaemia.
    Adolescents: 3 mg/kg once daily for the duration of stay in the nutritional centre (this corresponds to ferrous sulphate 10 mg/kg/day)
    Adults: 120 mg/day in 2 divided doses for the duration of stay in the nutritional centre (2 tablets of 200 mg of ferrous sulphate/day)
  • Intestinal parasites: on the 7th day treat with an anthelminthic: **albendazole** PO 400 mg or **mebendazole** PO 500 mg as a single dose (contra-indicated in the first trimester of pregnancy)
  • Malaria: thick film or rapid test on admission and treat according to results. In the absence of tests in endemic zones, treat systematically (page 127).
– Do not give vitamin A to pregnant women.
– Do not give systematic antibiotic therapy. Examine the patient and treat for any infection found.

Monitoring

Whatever the admission criteria, weight gain and the evolution of oedema allow a measurement of the impact of treatment.

For more information on the treatment of moderate or severe malnutrition in children or adults consult the MSF handbook, *Nutrition*.

[3] Doses are indicated in *elemental iron*. One tablet 200 mg tablet of ferrous sulphate contains 65 mg of elemental iron.

CHAPTER 2

Respiratory diseases

Rhinitis and rhinopharyngitis

Rhinitis and rhinopharyngitis are very common viral infections of the nasal or pharyngeal mucosa, which occur with seasonal variations (more frequent in cold and rainy seasons).

Clinical signs

– Nasal discharge, which may be accompanied by a sore throat, cough, fever; and diarrhoea in infants. Nasal obstruction may make breathing and breastfeeding difficult.

– May be the prodrome of measles, influenza etc.

– Often accompanied by conjunctivitis.

– May become secondarily infected or complicated by otitis media and acute sinusitis: in children under 5 years, routinely check the tympanic membranes.

– In recurrent and/or complicated forms: consider allergies, iron deficiency (to be treated) and tobacco smoke (to be eliminated).

Treatment

– Nasal irrigation with 0.9% sodium chloride or Ringer Lactate, 4 to 6 times/day to clear the airway.

– In patients with fever give **paracetamol** or **acetylsalicylic acid** PO (see *Fever*, page 26).

– Prevent or treat conjunctivitis (see *Conjunctivitis*, page 119).

– For allergic rhinitis only, give an antihistamine for 3 to 5 days:
promethazine PO
Children from 2 to 5 years: 5 to 15 mg once daily or in 2 divided doses
Children from 5 to 10 years: 10 to 25 mg once daily or in 2 divided doses
Children over 10 years and adults: 25 to 50 mg once daily or in 2 divided doses
or
chlorphenamine PO
Children from 2 to 5 years: 1 mg, to be repeated 4 to 6 times without exceeding 6 mg/day
Children from 6 to 12 years: 2 mg, to be repeated 4 to 6 times without exceeding 12 mg/day
Adults: 4 mg, to be repeated 4 to 6 times without exceeding 24 mg/day

Acute sinusitis

Acute sinusitis is an infection of the sinus mucosa with purulent discharge of nasal (rhinitis, allergies, obstruction) or dental origin. It may develop into chronic sinusitis, particularly in older children and adults.

Clinical signs

– Facial pain or ache and purulent nasal discharge

Older children and adults

– Peri-orbital pain in frontal sinusitis; facial pain in maxillary and/or ethmoidal sinusitis.
– Purulent nasal discharge from the side with pain, nasal obstruction and moderate fever.
– On examination
  • pain on pressure over the forehead, under the upper border of the orbit or cheek,
  • rhinoscopy: purulent secretions in the meatus and inflammation of the mucosa.

The most common causes are *Haemophilus influenzae* in children under 5 years and pneumococci in patients over 5 years.

Type specific to infants and small children

– Acute ethmoiditis: high fever, inflammation and swelling of the lower eyelids and the bridge of the nose, purulent nasal discharge.
– Risk of infection spreading to the neighbouring bony structures, orbits and the meninges.

The most common causes are *Haemophilus influenzae*, pneumococci and staphylococci.

Treatment

– Nasal irrigation with 0.9% sodium chloride or Ringer Lactate 4 to 6 times/day to clear the airway.
– Pain and fever: give **paracetamol** or **acetylsalicylic acid** PO (see pages 26 and 28).
– Antibiotic treatment, depending on the severity of infection:
  amoxicillin PO: 80 mg/kg/day in 2 or 3 divided doses for 7 to 10 days
  For patients allergic to penicillin:
  erythromycin PO: 30 to 50 mg/kg/day in 2 to 3 divided doses for 7 to 10 days
– For sinusitis secondary to dental infection: dental extraction while under antibiotic treatment.
– In infants with ethmoiditis, strong antibiotic treatment is necessary:
  ceftriaxone IM: 100 mg/kg/day in 2 injections for 10 days
  or, failing that,
  ampicillin IV: 200 mg/kg/day in 3 or 4 injections until improvement is seen, then change to oral treatment with **amoxicillin** PO: 100 mg/kg/day in 2 or 3 divided doses to complete 10 days of treatment

Acute laryngitis

Laryngitis is an acute infection of the laryngeal mucosa of viral or sometimes bacterial origin.

Clinical signs common to all laryngitis

– Inspiratory dyspnoea with cough and hoarse voice. Chest indrawing and stridor may be present.
– Signs of serious illness: sweating, tachycardia, cyanosis, altered level of consciousness.

Examine children in a sitting position. Do not lay children down: there is a risk of respiratory airway obstruction.

Aetiology and treatment

Children over 6 months

1st case: rapid onset dyspnoea (over a few hours)

– **Acute epiglottitis** due to *Haemophilus influenzae*: sudden onset, severe dyspnoea, chest indrawing, high fever, cervical lymphadenopathy. The child is sitting, breathing through the mouth, drooling clear saliva which he cannot swallow due to dysphagia. The overall condition may deteriorate very quickly.
  • Avoid examining the larynx (risk of respiratory arrest), do not lay the child down, keep him in a sitting position.
  • Have the child breathe in a humid environment (next to a bowl of water or a wet towel).
  • Antibiotic treatment:
  ceftriaxone IM: 100 mg/kg/day in 2 injections for 5 days
  or, failing that,
  ampicillin IV: 200 mg/kg/day in 3 or 4 injections, change as soon as possible to oral treatment with **amoxicillin** PO: 100 mg/kg/day in 2 or 3 divided doses to complete 5 days of treatment
  or
  chloramphenicol IV: 100 mg/kg/day in 3 injections, change as soon as possible to oral treatment, at the same dosages to complete 5 days of treatment
  • If a patient has severe respiratory distress: intubation in a specialised setting, or failing that, tracheotomy.

– **Spasmodic laryngitis** in a child with rhinitis or measles: sudden, nocturnal onset with coughing fits followed by periods of suffocation and inspiratory dyspnoea. The child may develop stridor. The voice remains hoarse after the attack. The child remains afebrile.
  • Monitor the child, try to keep him calm. Have him breathe in a humid environment (near a bowl of water or wet towel).

- Nasal irrigation with 0.9% sodium chloride or Ringer Lactate, 4 to 6 times/day to clear the airway.
- An antihistamine may be given for 3 days:
  promethazine PO
  Children from 2 to 5 years: 5 to 15 mg once daily or in 2 divided doses
  Children from 5 to 10 years: 10 to 25 mg once daily or in 2 divided doses
  Children over 10 years: 25 to 50 mg once daily or in 2 divided doses
  or
  chlorphenamine PO
  Children from 2 to 5 years: 1 mg, to be repeated 4 to 6 times without exceeding 6 mg/day
  Children from 6 to 12 years: 2 mg, to be repeated 4 to 6 times without exceeding 12 mg/day
- In children with severe dyspnoea:
  dexamethasone IM: 0.1 to 0.2 mg/kg as a single dose
  or **hydrocortisone** IM: 1 mg/kg as a single dose

2nd case: progressive onset dyspnoea (over more than 24 hours)

– **Viral subglottitis**: the onset is frequently nocturnal, the dyspnoea is typical, the cry and cough have a raucous sound, but expiration is unobstructed.
  - Monitor the child, try to keep him calm. Have him breathe in a humid environment (near a bowl of water or wet towel).
  - **dexamethasone** IM: 0.1 to 0.2 mg/kg or **hydrocortisone** IM: 1 mg/kg, to be repeated after 30 minutes if necessary
  - Antibiotics are not useful, except in cases of secondary infection (amoxicillin or cotrimoxazole).
  - In case of deterioration: intubation if possible, or, failing that, tracheotomy.

Note: exclude diphtheria (see *Diphtheria*, page 53) and retropharyngeal abscess.

Adults

– Usually viral: treatment is symptomatic (**paracetamol** or **acetylsalicylic acid** PO).

– Very rarely, epiglottitis due to *Haemophilus influenzae*, diphtheria or retropharyngeal abscess: same clinical signs and treatment as for children.

– Also consider laryngeal tuberculosis in a patient with tuberculosis, or cancer of the larynx, particularly if the patient smokes.

Acute tonsillitis

– Inflammation of the tonsils and pharynx.
– Tonsillitis is most commonly caused by viral infection and usually evolves towards spontaneous resolution.
– Streptococcus A tonsillitis is the most common bacterial infection. Ensuing severe late complications (acute rheumatic fever, glomerulonephritis, endocarditis, etc.), which are frequent in developing countries, can be avoided by antibiotic treatment.

Clinical signs

– Symptoms common to all types of tonsillitis: dysphagia (difficulty swallowing) and fever (not always present)

– Specific symptoms:
  • ***erythematous*** (red tonsils) or ***exudative tonsillitis*** (red tonsils with a whitish exudate):
  May be viral or streptococcal in origin.
  The presence, in children between 3 and 14 years, of at least 3 of the following signs strongly suggests streptococcal tonsillitis: absence of cough, fever above 38°C, at least one enlarged and tender anterior cervical lymph node, tonsillar exudate. In children under 3 years, streptococcal infection is unlikely.
  Infectious mononucleosis (IM), due to the Epstein-Barr virus, should also be suspected in adolescents or young adults presenting with extreme fatigue, diffuse adenopathies and often splenomegaly.
  • ***pseudomembranous tonsillitis*** (tonsil covered with a very adherent false membrane): see *diphtheria*, page 53.

– Other tonsillitis (much rarer)
  • ***vesicular tonsillitis***, always viral: Coxsackie infection, primary herpetic infection
  • ***ulcero-necrotic tonsillitis***:
    – Vincent tonsillitis: in a patient with poor oral hygiene, malodorous breath and tonsillar ulcer soft on palpation.
    – syphilitic tonsillitis: painless, hard chancre of the tonsil.
  • ***other erythematous tonsillitis***: gonococcal tonsillitis and primary HIV infection. The diagnosis is often prompted by the patient's medical history.

– Local complications:
  Peritonsillar abscess: fever, intense pain, hoarse voice, trismus (limitation of the mouth opening), unilateral deviation of the uvula.

Treatment

– Viral tonsillitis is usually a self-limited illness. Spontaneous resolution typically occurs within a few days (or weeks for IM). Treat only fever and pain: **paracetamol** PO or **ibuprofen** PO (see *fever*, page 26 and *pain*, page 28).

– Diphtherial tonsillitis: see *diphtheria*, page 53

– Streptococcus A tonsillitis:

  • Treatment of fever and pain as above.

  • Antibiotic therapy:
    benzathine benzylpenicilin IM as a single dose
    Children under 6 years: 600 000 IU
    Children over 6 years and adults: 1.2 MIU

    phenoxymethylpenicilin (**penicillin V**) PO for 10 days
    Children under 1 year: 250 mg/day in 2 divided doses
    Children from 1 to 5 years: 500 mg/day in 2 divided doses
    Children from 6 to 12 years: 1 g/day in 2 divided doses
    Adults: 2 g/day in 2 divided doses

    amoxicillin PO for 6 days
    Children: 50 mg/kg/day in 2 divided doses
    Adults: 2 g/day in 2 divided doses

    erythromycin PO for 10 days
    Children: 30 to 50 mg/kg/day in 2 to 3 divided doses
    Adults: 2 to 3 g/day in 2 to 3 divided doses

    azithromycin PO for 3 days
    Children: 20 mg/kg once daily
    Adults: 500 mg once daily

    Choice of antibiotic for streptococcus A tonsillitis:
    - if disposable injection equipment is available, **benzathine benzylpenicillin** is the drug of choice as: no cases of streptococcus A resistance to penicillin have been reported; it is the only antibiotic proven effective in reducing the incidence of rheumatic fever; and the treatment is administered as a single dose;
    - no cases of streptococcus A resistance to **penicillin V** have been reported, but there is a risk of non-adherence due to the length of treatment;
    - **amoxicillin** should be avoid when mononucleosis is suspected (risk of hypersensitivity skin rash to amoxicillin);
    - **erythromycin** and **azithromycin** are above all useful for penicillin allergic patients, but resistance to macrolides is increasing. There is a risk of non-adherence with erythromycin due to the length of treatment. Azithromycin treatment has the advantage of being short.

– Vincent tonsillitis: **penicillin V** or **erythromycin** as above.

– Gonococcal or syphilitic tonsillitis: see treatment of gonorrhoea (page 223) and syphilis (page 227).

– Local complications: surgical drainage in the event of peritonsillar abscess.

Diphtheria

Diphtheria is a bacterial infection due to *Corynebacterium diphtheriae*, characterized by local proliferation (most commonly ENT) of the bacteria, and systemic diffusion of the diphtheria toxin through the body.
Transmission is by direct contact with an infected person.

Clinical signs

– Incubation period: 3 to 5 days
– Local signs:
  • febrile tonsillitis with pseudomembranes (grey, tough and very sticky false membranes) sometimes accompanied by signs of serious illness: high fever (greater than 39°C), oliguria, cervical oedema, enlarged cervical lymph glands and signs of haemorrhage (cervical or thoracic purpura, gingival bleeding, epistaxis).
  • laryngitis, most commonly secondary to the tonsillitis. Risk of death by asphyxiation.
  • other local signs: rhinitis (often unilateral); secondary infection of a skin lesion with *C. diphtheriae*.
– General signs due to the toxin:
  • mycocarditis: clinically detectable arrhythmias or cardiac conduction defects in 25% of patients. These are more serious when appear early (from the 5th day).
  • neuropathies may occur 1 to 3 months after the onset of the disease: paralysis of the soft palate, respiratory muscles, limbs and accommodation.
  • more rarely: pneumonia, renal failure with oligo-anuria and haematuria.

Laboratory

Confirmation is made by isolating the toxic strain of *C. diphtheriae* from a throat swab.

Treatment (at hospital level)

– Strict isolation.
– Treatment with antitoxin serum: do not wait for bacteriological confirmation.
  For **diphtheria antitoxin** derived from horse serum, administer according to the Besredka method[1].
  Doses are given as a function of the severity of illness, and the delay in treatment:

	Dose in units	Administration route
Laryngitis or pharyngitis	20 000 to 40 000	Depends on the volume to be administered: IM or for volumes greater than 20 000 units IV infusion in 200 ml 0.9% NaCl, over one hour
Rhinopharyngitis	40 000 to 60 000	
Serious forms or if treatment is started more than 48 hours after onset of symptoms	80 000 and up to 100 000	

[1] Besredka method: inject 0.1 ml SC and wait 15 minutes. If there is no allergic reaction (no erythema at the injection site or a flat erythema of less than 0.5 in diameter, inject a further 0.25 ml SC. If there is no reaction after 15 minutes, inject the rest of the product IM or IV depending on the volume to be administered. In the event of an anaphylactic reaction, give **epinephrine** (**adrenaline**) IM, to be repeated every 5 minutes if there is no improvement:
Infants and children: 0.01 mg/kg/injection
Adults: 0.25 to 0.75 mg/injection
Insert an IV line. In the event of anaphylactic shock, see *Shock*, page 17.

– Antibiotic treatment:
benzathine benzylpenicillin IM
Children under 6 years: 600 000 IU as a single dose
Children over 6 years and adults: 1.2 MIU as a single dose

For penicillin-allergic patients:
erythromycin PO
Children: 50 mg/kg/day in 2 to 3 divided doses for 7 days
Adults: 2 to 3 g/day in 2 to 3 divided doses for 7 days

– Urgent intervention to secure an airway (intubation, tracheotomy) may be necessary in the event of laryngeal obstruction or cardiac or neurologic complications.

Management of close contacts

– Nose and throat cultures.
– Daily clinical monitoring (throat examination and temperature) for 7 days.
– Quarantine
– Antibiotic treatment: see above.
– Verify vaccination status:
  • less than 3 injections: complete with DTP, DT or Td depending on age,
  • 3 injections: if the last injection was given more than one year before, give a booster dose.

The same precautions should be taken for contacts of healthy carriers.

Prevention

There are 3 combined vaccines:
DTP: diphtheria-tetanus-pertussis
DT: diphtheria (30 IU) and tetanus, for those under 7 years of age
Td: diphtheria (3 IU) and tetanus, for those over 7 years of age

– In the event of an epidemic, mass vaccination:
Update routine vaccinations with DTP for children under 3 years of age; DT for children from 3 to 6 years of age; Td for children over 7 years of age and adults.

– Routine vaccination (EPI). The recommendations vary according to the country. For information:
DTP: 3 doses at one month intervals before the age of 1 year, DTP booster one year later, and DT at 6 years of age followed by 3 more boosters at 10 year intervals.

Note: the disease does not give immunity. Update the vaccination of the patients once they have recovered. Vaccination does not prevent individuals from becoming carriers.

Otitis

Acute otitis externa

Acute otitis externa is an inflammation of the external auditory meatus. It is sometimes due to a foreign body.

Clinical signs and treatment

– Pain, particularly when the auricle is moved, with or without discharge.
– Otoscopy: redness, furuncle or infected eczema of the external canal; if visible, the tympanic membrane is normal.
– Look for a foreign body.

– Pain: give **paracetamol** or **acetylsalicylic acid** PO (see *Pain*, page 28).
– Aspiration and irrigation of the ear with 0.9% sodium chloride or Ringer Lactate, then apply **gentian violet** with a cotton bud for 3 to 5 days.
– If present, remove the foreign body.

Acute otitis media

Acute otitis media is a bacterial (streptococcus, pneumococcus, *Haemophilus influenzae*) or viral infection of the middle ear. If left untreated, there is a (low) risk of mastoiditis and chronic otitis.

Clinical signs and treatment

– Pain (may be absent), fever, agitation, diarrhoea and vomiting.
– Otoscopy: the tympanic membrane is, depending on the stage, congested, inflamed, bulging or perforated with discharge. Discharge from the ear may be the first sign of acute otitis media.
– Most commonly the patient started a rhinopharyngitis a few days before presenting with ear infection.
– In the patient also has conjunctivitis, consider an *H. influenzae* infection.

– Pain and fever: give **paracetamol** or **acetylsalicylic acid** PO (see pages 26 and 28).
– Clear the nose as for rhinitis with 0.9% sodium chloride or Ringer Lactate.

– Antibiotic treatment:
  • Antibiotic therapy for all children under 6 months of age.
    The most effective first-line treatment is **amoxicillin** PO:
    70 to 90 mg/kg/day in 2 to 3 divided doses for 5 days

    or, for patients allergic to penicillin:
    erythromycin PO: 30 to 50 mg/kg/day in 2 to 3 divided doses for 5 days

    If there is no improvement after 48 hours of correct treatment, change to **ceftriaxone** IM: 50 mg/kg once daily for 5 days

  • In children over 6 months of age, otitis is usually viral. If it is possible to re-examine the child 3 days after the initial consultation, prescribe an analgesic only. Postponing antibiotic therapy often avoids the prescription of unnecessary antibiotics.
    If the child cannot be re-examined 3 days later or if the fever and pain continues despite the analgesic, administer antibiotic therapy as described above.

– As for persistant rhinopharyngitis, eliminate or treat risk factors (smoky environment, allergies, iron deficiency).

Chronic otitis

Chronic infection of middle ear with perforation of the tympanic membrane. It may lead to deafness, mastoiditis or meningitis (particularly pneumococcal) due to secondary infections.

Clinical signs and treatment

– Chronic clear otorrhoea.
– Fever and pain with drainage through the perforated membrane obstructed due to secondary infection with staphylococcus or pneumococcus or Gram negative bacilli.

– Pain and fever: give **paracetamol** or **acetylsalicylic acid** PO (see pages 26 and 28).
– Aspiration of the pus with a syringe to restore drainage and cautious irrigation with 0.9% sodium chloride or Ringer Lactate.
– Insert a small amount of dry cotton wool or a cotton wick into the ear to absorb the discharge. Change the cotton 3 to 4 times/day until the discharge has stopped.
– Avoid antibiotics: local treatment should dry up the drainage.
– If pain and fever persist despite local treatment: treat as acute otitis media.

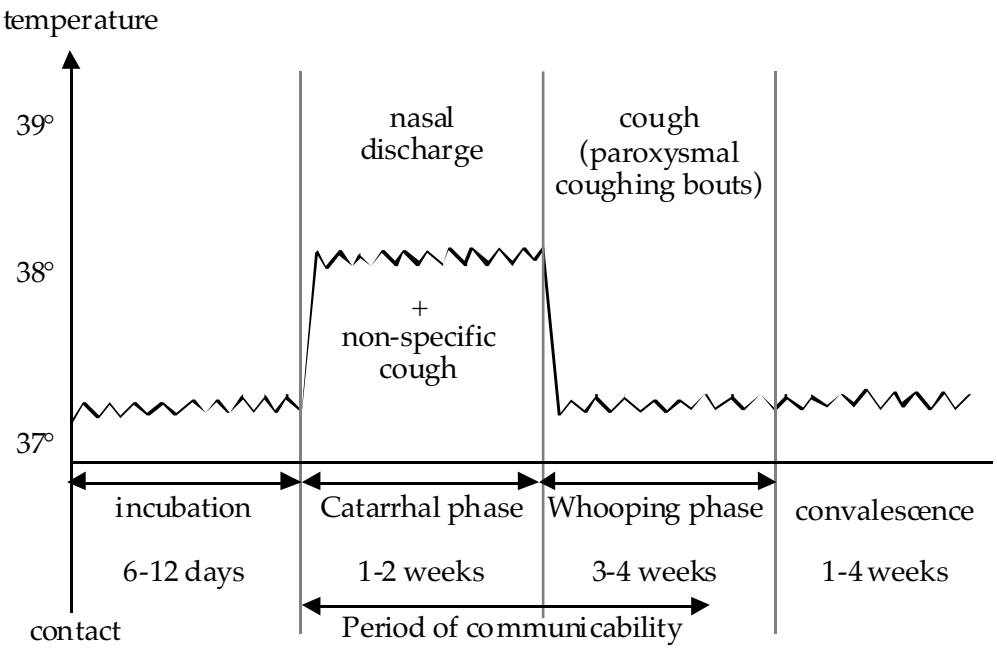
Pertussis

Pertussis is a very contagious childhood illness due to *Bordetella pertussis*. Transmission is by direct inhalation of microdroplets spread by infected patients.
Pertussis in populations living in poor conditions has a considerable effect on the nutritional status of children and may have a role in increasing infant mortality. This impact explains the importance of vaccination.

Clinical signs

– Pertussis is commonly misdiagnosed as another respiratory infection.
– Typical form of pertussis in non-vaccinated children: coughing bouts, inspiratory whoop, vomiting brought on by cough.

Clinical evolution and temperature curve of pertussis



– Atypical forms:
  • in children under 3 months of age: attacks of apnoea or cyanosis without cough and asphyxiating cough which may cause death (infants with pertussis require constant close monitoring)
  • in adults: prolonged cough

Complications

– Major, potentially fatal: secondary respiratory infections (pneumonias); and rarely neurological complications (seizures, encephalitis).
– Minor: conjunctival haemorrhage, petechia.
– Coughing bouts may lead to vomiting and poor feeding which may precipitate malnutrition.

Treatment

– Hospitalise children under 1 year of age or any severe cases.

– Children under 3 months of age should be monitored 24 hours per day due to the risk of apnoea and asphyxia.

– Antibiotic treatment:
Useful even if prescribed up to 3 weeks after the onset of the coughing bouts (or 6 weeks after the onset of coughing bouts in children under 1 year of age).
erythromycin PO: 50 mg/kg/day in 2 or 3 divided doses for 14 days
In the event of complications (*Acute pneumonia*, see page 63; *Otitis*, see page 55), adapt treatment accordingly.

– Keep the air humid with a bowl of water or a wet towel.

– Keep the patient well hydrated and give a high calorie, protein rich diet.
Children under 5 years of age are most at risk of dehydration.
Continue to breastfeed and give food supplements during the weeks following the infectious episode (malnutrition may develop slowly). Advise the mother to feed the child after the coughing bouts and vomiting. Give frequent, but small quantities of food.

– Prophylaxis: discuss antibiotic prophylaxis with erythromycin (as above) for close contacts (children of the same family).

Prevention

– Combined diphtheria-tetanus-pertussis vaccine from the age of 6 weeks:
3 doses of 0.5 ml at 4 week intervals; booster dose 1 year after the 3rd dose.

Bronchitis

Acute bronchitis

An acute inflammation of the bronchial mucosa, most commonly of viral origin. In older children it can be caused by *Mycoplasma pneumoniae*. In children over 2 years of age with repetitive acute bronchitis or 'wheezing' bronchitis, consider asthma (see *Asthma*, page 70). In children under 2 years of age, consider bronchiolitis (see *Bronchiolitis*, page 61).

Clinical signs

Often begins with a rhinopharyngitis that descends progressively: pharyngitis, laryngitis, tracheitis.
– Heavy cough, dry at the beginning then becoming productive
– Low-grade fever
– No tachypnoea, no dyspnoea
– On pulmonary auscultation: bronchial wheezing

Treatment

– Fever: **paracetamol** or **acetylsalicylic acid** PO (see *Fever*, page 26).
– Keep the patient hydrated, humidify air (with a bowl of water or a wet towel).
– Children: nasal irrigation with 0.9% sodium chloride or Ringer Lactate, 4 to 6 times/day to clear the airway.
– Antibiotic treatment is not useful for patients in good overall condition with rhinopharyngitis or influenza.
– Antibiotic treatment is indicated only if:
  • the patient is in poor general condition: malnutrition, measles, rickets, severe anaemia, cardiac disease, elderly patient etc.
  • if the patient has dyspnoea, fever greater than 38.5°C and purulent expectorations: a secondary infection with *Haemophilus influenzae* or with pneumococcus is probable.

amoxicillin PO
Children: 100 mg/kg/day in 2 or 3 divided doses for 5 days
Adults: 3 g/day in 2 or 3 divided doses for 5 days
or
chloramphenicol PO
Children over 2 months: 50 to 100 mg/kg/day in 3 divided doses for 5 days
Adults: 3 g/day in 3 divided doses for 5 days

Chronic bronchitis

A chronic inflammation of the bronchial mucosa due to irritation (tobacco, pollution), allergy (asthma) or infection (repetitive acute bronchitis). It may develop into chronic obstructive pulmonary disease.

Clinical signs

– Productive cough for 3 consecutive months per year for 2 successive years.
– No dyspnoea at onset. Dyspnoea develops after several years, first on exertion, then becoming persistent.
– On pulmonary auscultation: bronchial wheeze (always exclude tuberculosis).

A patient with an acute exacerbation of chronic bronchitis presents with:
– Onset or increase of dyspnoea
– Increased volume of sputum
– Purulent sputum

Treatment

– Antibiotic treatment is not useful in treating simple chronic bronchitis.
– Antibiotic treatment may be useful, for patients in a poor general condition only, for acute exacerbations of chronic bronchitis (see *Acute bronchitis*, previous page).
– Discourage smoking and other irritating factors.

Bronchiolitis

Bronchiolitis is an acute viral infection of the bronchioles. In children under 24 months of age it may lead to fatal respiratory distress. Bronchiolitis occurs with seasonal variations and has epidemic potential. Patients recover fully once past the critical phase. Recurrence is possible.

Clinical signs

The onset is often during a rhinopharyngitis:
– Dyspnoea with cough, distension of the thorax and low-grade fever.
– On pulmonary auscultation: laborious expiration with diffuse wheeze. Occasionally fine, diffuse, bilateral late inspiratory crepitations.

Signs of serious illness:
– Respiratory rate > 50 breaths/minute
– Cyanosis (examine the lips, buccal membranes and fingernails)
– Nasal flaring
– Chest indrawing
– Periods of apnoea
– Altered level of consciousness
– Difficulty drinking or breastfeeding
– Silence on auscultation (corresponding to an intense bronchospasm)

Treatment

Hospitalise children at risk (children under 2 months of age, malnourished or HIV infected children) and children with at least one sign of serious illness.

– Monitor closely, with the patient in a 1/2 sitting position.
– Nasal irrigation with 0.9% sodium chloride or Ringer Lactate, 4 to 6 times/day to clear the airway. For outpatient treatment, teach the mother how to irrigate the child's nose.
– Keep the air humidified (place a bowl of water or a wet towel next to the child).
– Give oral fluids (or by nasogastric tube if necessary): 80 to 100 ml/kg/day in small quantities throughout the day.
– Bronchodilators do not always improve the clinical state (they may even aggravate it). In children under 3 months of age and in severe cases, give a therapeutic trial with inhaled **salbutamol** using a spacer: 2 puffs, then wait 30 minutes and administer a further 2 puffs. If there is improvement, continue to give 1 puff 4 times/day, if there is no improvement, stop treatment.
– Treatment with corticosteroids, in principle, has no effect. In severe forms (hospitalised patients) it may eventually have a beneficial effect:
prednisolone PO: 1 to 2 mg/kg/day for 5 days (or, only if oral treatment is impossible, **dexamethasone** IM or slow IV: 0.2 mg/kg/day)

– Antibiotic treatment only for children with secondary infection (*Haemophilus influenzae*, pneumococcus): fever great than 39°C, purulent sputum, aggravation of respiratory symptoms.

  • According to the severity, give oral or parenteral antibiotics for 5 days:
  amoxicillin PO or **ampicillin** IM: 100 mg/kg/day in 3 divided doses or injections
  or
  chloramphenicol PO or IM (in children over 2 months): 50 to 100 mg/kg/day in 3 divided doses or injections

  Re-evaluate every day:
  If the child is improving: continue with the same antibiotic to complete treatment
  If there is no change or if the child's condition is deteriorating, change antibiotic:
  - if the child was taking chloramphenicol: give amoxicillin,
  - if the child was taking amoxicillin: give chloramphenicol.

  • In children under 2 months: see *Acute pneumonia*, next page.

– If the child has signs of serious illness: oxygen at a rate of 1 to 3 litres/minute.

– If the child is getting worse and is at risk of respiratory failure: intubate or ventilate.

Acute pneumonia

Acute pneumonia is a viral, bacterial (pneumococcus, *Haemophilus influenzae*, *Mycoplasma pneumoniae*) or parasitic (*Pneumocystis carinii* in HIV infected patients) infection of the pulmonary alveoli.

Pneumonia in children under 5 years of age

Clinical signs

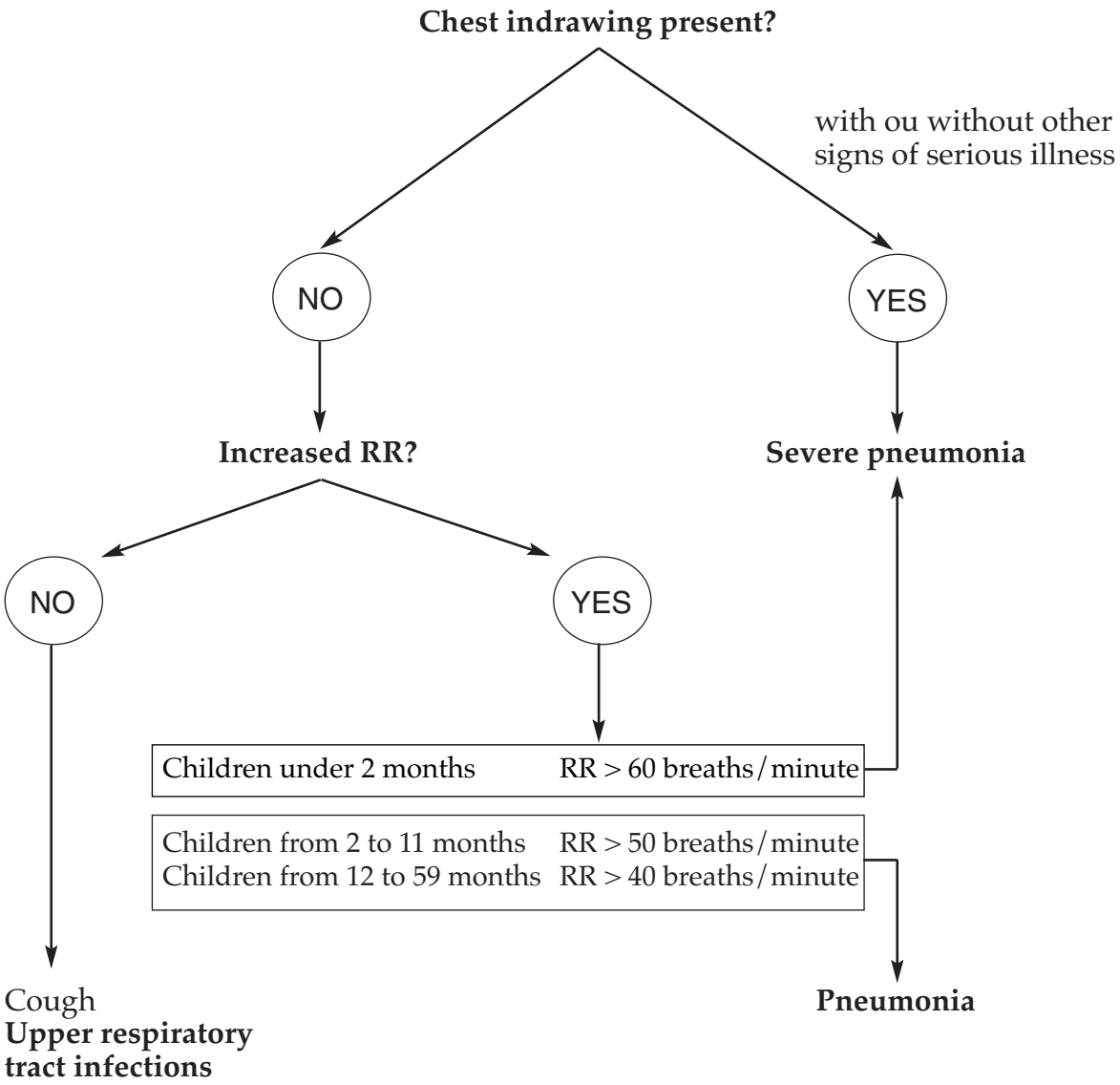
The most common causes are viruses, pneumococci and *Haemophilus influenzae*.
Pneumonia should be suspected in all children who present with **cough** or **difficulty breathing**.
- Often high fever (great than 39°C), but the child may present with low-grade fever or be afebrile (often a sign of serious illness).
- Clinical examination must be done on a calm child in order to correctly count the respiratory rate and to look for signs of serious illness.
- Pulmonary auscultation is often difficult: dullness with diminished vesicular breath sounds, crepitations and sometimes bronchial breathing or normal pulmonary auscultation.
- Respiratory rate: because it fluctuates, respiratory rate (RR) should be measured over 1 minute. Use a WHO timer or a watch with a second hand.
  A child has tachypnoea (increased respiratory rate) if:
  RR > 60 breaths/minute in children under 2 months
  RR > 50 breaths/minute in children from 2 to 11 months
  RR > 40 breaths/minute in children from 12 months to 5 years

Signs of serious illness (in a calm child who is either resting or asleep) are:
- Chest indrawing: the inferior thoracic wall depresses on inspiration as the superior abdomen expands
- RR > 60 breaths/minute in children under 2 months
- Cyanosis (examine the lips, buccal membranes and fingernails)
- Nasal flaring
- The child refuses to drink or breastfeed
- The child is abnormally sleepy or difficult to wake
- Stridor (hoarse noise on inspiration)
- Grunting (a short repetitive noise produced by a partial closure of the vocal cords) on expiration
- Severe malnutrition

Notes:
- In children, fever may cause the RR to increase by 10 breaths/minute with each increase of 1°C.
- In malnourished children, the RR thresholds should be decreased by 5 breaths/minute from those listed above.
- Chest indrawing is not significant if it is not clearly visible and present at all times. If it is only observed when a child is upset or feeding and is not visible when the child is resting, there is no chest indrawing.

– In children under 2 months of age, moderate chest indrawing is normal as the thoracic wall is flexible.
– If only the soft tissues between the ribs or above the clavicles depress, there is no chest indrawing.
– Exclude severe malaria which may also cause respiratory signs with cough and tachypnoea. Clinical anaemia, splenomegaly, and full, deep breathing are suggestive of severe malaria. Unilateral signs on auscultation, the presence of crepitations and chest indrawing are more suggestive of pneumonia.
– In patients with painful abdominal swelling and diarrhoea, consider staphylococcal pneumonia (see page 69).

Diagnosis of pneumonia in children under 5 presenting with cough or difficulty breathing:



Treatment

Severe pneumonia (at hospital level)

In children under 2 months of age

Treatment of choice is:
ceftriaxone IM or slow IV[1]
Newborns: 50 mg/kg by infusion over 60 minutes, once daily
Children over 1 month: 50 mg/kg by IM or slow IV injection once daily (over 3 minutes) for a minimum of 3 days, then change to oral treatment with **amoxicillin** PO: 100 mg/kg/day in 3 divided doses to complete 7 to 10 days of treatment

or, failing that,
ampicillin IV or IM: 100 mg/kg/day in 3 or 4 injections. Once the fever has disappeared or there are no more signs of serious illness, change to oral treatment with amoxicillin at the same dosage, to complete 7 to 10 days of treatment.
+ **gentamicin** IM: 3 to 6 mg/kg once daily for 7 days

If there is no improvement or if the child's condition is deteriorating after 48 hours of correct treatment, consider staphylococcal pneumonia (see page 69).

Children from 2 months to 5 years of age

ampicillin IV or IM + **gentamicin** IM at the same doses as for infants under 2 months (see above).
or
chloramphenicol IV or IM: 100 mg/kg/day in 3 injections for a minimum of 5 days, then change to oral treatment at the same dosage to complete 7 to 10 days of treatment

If there is no improvement or if the child's condition is deteriorating after 48 hours of correct treatment, consider staphylococcal pneumonia (see page 69).

When the correct administration of injectable chloramphenicol or ampicillin 3 times daily cannot be guaranteed, the antibiotic of choice is **ceftriaxone** IV or IM, followed by **amoxicillin** PO, at the same dosage as for children under 2 months (see above).

Adjuvant therapy for all patients

- Fever: give **paracetamol** or **acetylsalicylic acid** PO (see *Fever*, page 26).
- Nasal irrigation with 0.9% sodium chloride or Ringer Lactate to clear the airway.
- Oxygen at a rate of 1 litre/minute.
- Maintain adequate hydration and nutrition: in children under 12 months, milk (use a breast pump when appropriate) and water by spoon on demand. In children over 12 months, give food, milk and water on demand.
- If the child refuses to eat, use a nasogastric tube. In children under 12 months: 5 ml/kg/hour. In children over 12 months: 3 to 4 ml/kg/hour; alternate milk, water and **ORS** if necessary.
- Children under 2 months: keep warm.

[1] The solvent of ceftriaxone for IM injection contains lidocaine. Ceftriaxone reconstituted using this solvent must NEVER be administered by IV route. For IV administration, water for injection must always be used

Pneumonia with no signs of serious illness (at dispensary level, except for young infants)

Children under 2 months of age

Treat in hospital as severe pneumonia (see above).

Children from 2 months to 5 years of age

Haemophilus influenzae is common at this age, as is pneumococcus which is more serious:
amoxicillin PO: 100 mg/kg/day in 3 divided doses for 5 days

Follow-up in 48 hours or sooner if the child's condition deteriorates:
– If the child is improving: continue with the same antibiotic to complete treatment.
– If there is no improvement despite correct treatment, change to **chloramphenicol** PO: 100 mg/kg/day in 3 divided doses for 5 days.
– If the child's condition is deteriorating: hospitalise and treat as severe pneumonia.

Pneumonia in children over 5 years and adults

Clinical signs

The most common causes are viruses, pneumococci, and *Mycoplasma pneumoniae*.
– Cough, with or without purulent sputum, fever, thoracic pain, tachypnoea
– On pulmonary auscultation: decreased vesicular breath sounds, dullness, localised foci of crepitations, sometimes bronchial wheeze.

Sudden onset with high fever (higher than 39°C), thoracic pain and oral herpes are suggestive of pneumoccal infection. Symptoms may be confusing, particularly in children with abdominal pain, meningeal syndrome etc.

Signs of serious illness (severe pneumonia):
– Cyanosis (examine the lips, buccal mucosa, and the fingernails)
– Nasal flaring
– Intercostal or subclavial indrawing
– RR > 30 breaths/minute
– Heart rate > 125 beats/minute
– Altered level of consciousness (drowsiness, confusion)

Those at risk include the elderly, immunocompromised patients (severe malnutrition, HIV infection with CD4 < 200 cells/mm^3 or splenectomy) or patients suffering from heart failure, sickle cell disease or severe chronic bronchitis.

Treatment

Severe pneumonia (at hospital level)

benzylpenicillin procaine + benzylpenicillin IM
Children: 100 000 IU/kg once daily for 2 to 3 days then, once the fever or signs of severe illness have disappeared, change to oral treatment with **amoxicillin** PO: 100 mg/kg/day in 3 divided doses to complete 7 days of treatment.
Adults: 3 to 4 MIU once daily for 2 to 3 days then, once the fever or signs of severe illness have disappeared, change to oral treatment with **amoxicillin** PO: 3 g/day in 3 divided doses to complete 7 days of treatment.
or
ampicillin IV or IM
Children: 100 mg/kg/day in 3 injections
Adults: 3 g/day in 3 injections
Once the fever or signs of severe illness have disappeared, change to oral treatment with **amoxicillin** PO at the same dosage to complete 7 days of treatment

If there is no improvement after 48 hours of correct treatment, change antibiotic treatment to:
chloramphenicol IV or IM
Children: 100 mg/kg/day in 3 injections for 2 to 3 days
Adults: 3 to 4 g/day in 3 injections for 2 to 3 days
Then change to oral treatment at the same dosage to complete 7 days of treatment.

When the correct administration of injectable chloramphenicol or ampicillin 3 times daily cannot be guaranteed, the antibiotic of choice is **ceftriaxone** IV or IM, followed by **amoxicillin** PO:
Children: same dosage as for children under 2 months (see page 65).
Adults: **ceftriaxone** IM or slow IV (over 3 minutes): 1 g once daily for a minimum of 3 days followed by **amoxicillin** PO: 3 g/day in 3 divided doses to complete 7 to 10 days of treatment.

Adjuvant therapy for all patients
– Fever (see *Fever*, page 26).
– Nasal irrigation with 0.9% sodium chloride or Ringer Lactate to clear the airway.
– Oxygen at a rate of 1 litre/minute.
– Maintain adequate hydration and nutrition. Use a nasogastric tube if necessary.

Pneumonia without signs of serious illness (at dispensary level)

Typical pneumonia (acute lobar pneumonia)

Pneumococcus is the most common cause.

benzylpenicillin procaine + benzylpenicillin IM
Children: 100 000 IU/kg once daily for 5 days
Adults: 3 to 4 MIU once daily for 5 days
or
amoxicillin PO
Children: 100 mg/kg/day in 3 divided doses for 5 days
Adults: 3 g/day in 3 divided doses for 5 days

Follow-up in 48 hours or sooner if the patient's condition deteriorates:
– if the patient is improving: continue with the same antibiotic to complete treatment.
– if the patient's condition is deteriorating: hospitalise and treat as severe pneumonia.

Persistent pneumonia

Consider an atypical pneumonia (*Mycoplasma pneumoniae*, *Chlamydia pneumoniae*).

erythromycin PO
Children: 50 mg/kg/day in 2 or 3 divided doses for 10 days
Adults: 2 to 3 g/day in 2 or 3 divided doses for 10 days

or, failing that,
doxycycline PO (contra-indicated in children under 8 years and pregnant or lactating women)
Children: 4 mg/kg/day in 2 divided doses for 10 days
Adults: 200 mg/day in 2 divided doses for 10 days

If signs persist after 2 consecutive treatments, consider tuberculosis (see *Tuberculosis*, page 74) or *Pneumocystis carinii* pneumonia (see *HIV infection and AIDS*, page 204).

Staphylococcal pneumonia

Pneumonia due to *Staphylococcus aureus*, specific to infants, often those in a poor general condition (malnutrition, skin lesions etc.). Staphylococcal pneumonia is a classic complication of measles.

Clinical signs

– General signs: change in overall condition, grunting, pallor, high fever or hypothermia, frequently signs of shock (see *Shock*, page 17) and the presence of skin lesions (point of bacterial entry).
– Gastrointestinal signs: nausea, vomiting, diarrhoea, painful abdominal distention.
– Respiratory signs: dry cough, tachypnoea, signs of distress (nasal flaring, chest indrawing).
– Pulmonary auscultation: often normal. Sometimes dullness indicating pleural effusion.

If possible, take a chest x-ray: the presence of bullae confirms the diagnosis. Pleural effusion, often unilateral, may also be seen.

Treatment

Treatment is urgent as patients deteriorate quickly: hospitalise.

– Antibiotic treatment:
cloxacillin IV: 100 mg/kg/day in 4 injections for 10 days
+
gentamicin IM: 3 to 6 mg/kg/day in 1 or 2 injections for 10 days
or **chloramphenicol** IV (for children over 2 months): 100 mg/kg/day in 3 injections for 10 days
– Oral (or with a nasogastric tube) or intravenous hydration.
– Oxygen at a rate of 1 litre/minute.
– Local disinfection of skin lesions (see *Bacterial skin infections*, page 100).
– If there is significant pleural effusion: pleural tap with drainage (for pyopneumothorax; insert 2 drains, one anterior and one posterior) or without drainage (for suppurative pleurisy, make repetitive taps with an IV catheter).

Clinical evolution

– There is a serious risk of decompensation from pneumothorax or suppurative pleurisy or pyopneumothorax.
– On a paediatric ward, adequate equipment for urgent pleural drainage should always be available.

Asthma

– Asthma is a chronic inflammatory disease characterized by bronchial hyperresponsiveness to multiple stimuli (allergens, infection, aspirin, tobacco etc.) and bronchial obstruction which is at least partially reversible, either spontaneously or with treatment.
– An *asthma attack* is an episodic exacerbation of a chronic inflammation of the airway. The severity and duration of an attack are variable and unpredictable.
– The frequency of asthma attacks in the months preceeding the consultation define the severity of asthma: *intermittent asthma* or *persistant asthma*.
– Long term treatment is only useful for patients with persistant asthma. The objective is to control and prevent the symptoms, to maintain pulmonary function and to improve the quality of life.

Clinical signs

– Dyspnoea, spasmodic cough and wheeze, sputum production[1]
– On pulmonary auscultation: expiratory sibilant rales throughout both lung fields
– 3 forms are identified:
  • ***Mild attack***: RR (respiratory rate) normal or increased, dyspnoea, few wheezes, no chest indrawing, pulse < 100 beats/minute in adults, the patient can walk and lie down.
  • ***Moderate attack***: RR increased, dyspnoea interferes with speech, marked wheeze, chest indrawing, pulse 100-120 beats/minute in adults, the patient is most comfortable when sitting.
  • ***Severe attack***: RR increased[2], speech difficult, chest indrawing, pulse > 120 beats/minute in adults, anxiety. The attack may be life threatening if one of the following serious signs is present: no sounds on auscultation, cyanosis, altered level of consciousness, bradycardia, shock.
– Asthma attacks may be isolated (symptoms start a few hours or minutes prior to consultation) or may be preceded by other asthma attacks or respiratory difficulties in the days or weeks prior to the consultation.

Treatment of an asthma attack

Treatment depends on the severity of the attack, if it is an isolated attack or one of many recurrent attacks, and the response to treatment.

– The ***attack is mild***, isolated, and there are no severe signs
  • Reassure the patient, place him in a 1/2 sitting position
  • Give inhaled **salbutamol** (100 micrograms/puff): 2 to 4 puffs at intervals of several minutes. In children, use a spacer[3] to ease administration. Let the child breathe 4 to 5 times from the spacer before repeating the procedure.

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1 Identical signs may also be seen during the invasion phase of several parasitic infections: ancylostomiasis, strongyloidiasis, ascariasis, schistosomiasis or filariasis. Consider these parasites and treat accordingly (see Chapter 6).

2 RR > 30 breaths/minute in adults; for increased RR in children: see page 63.

3 If a conventional spacer is not available, use a 500 ml plastic bottle: insert the mouthpiece of the inhaler into a hole made in the bottom of the bottle (the seal should be as tight as possible). The child breathes from the mouth of the bottle in the same way as he would using a spacer. The use of a plastic cup instead of a spacer is not effective enough to be recommended.

- If the attack is completely resolved, observe the patient for at least 1 hour (4 hours if he lives far from the health centre). Give outpatient treatment with inhaled **salbutamol** (2 puffs) for 24 to 48 hours *only if symptomatic*.
- If the attack is only partially resolved or there is no improvement, the attack is moderate or severe: treat as below.

– ***The attack is moderate or severe***

- Inhaled **salbutamol**: do not hesitate to increase the dosage, for example to 4 or 5 puffs every 10 minutes until there is improvement. In the event of a severe attack, use a spacer to increase effectiveness, irrespective of age.
  + **prednisolone** PO
  Children: 1 to 2 mg/kg once daily in the morning
  Adults: 0.5 to 1 mg/kg once daily in the morning
- Observe the patient for at least 4 hours after the symptoms stop.
- For 24 to 48 hours following an attack give inhaled **salbutamol**: 2 puffs every 6 hours, on an outpatient basis.
- Continue prednisolone for 10 days at tapered dosages.
- Follow-up in 10 days:
  - consider long-term treatment if the asthma attacks have been occurring for several months
  - if the patient is already receiving long-term treatment, re-evaluate the severity of the asthma (see table, page 72) and adjust treatment accordingly.

– ***The attack has not been resolved by treatment and there are signs of serious illness***

At dispensary level:

- Inhaled **salbutamol**: 5 puffs every 10 minutes until there are signs of improvement (and, in adults only: **salbutamol** SC: 0.5 mg).
- Insert an IV line, administer **hydrocortisone** IV (100 mg for children; 200 mg for adults) and refer.

At hospital level:

- Oxygen at a fast rate
- Inhaled **salbutamol**: 5 puffs, preferably using a spacer, every 10 minutes until there are signs of improvement, then reduce the dose and the number of administrations.
  + **hydrocortisone** IV:
  Children: 100 mg, to be repeated every 6 hours if necessary
  Adults: 200 mg, to be repeated every 2 hours if necessary
  Change to oral treatment as soon as possible with **prednisolone** PO:
  Children: 1 to 2 mg/kg once daily in the morning for 5 days (without exceeding 20 mg/day in children under 5 years and 40 mg/day in children over 5 years)
  Adults: 0.5 mg to 1 mg/kg once daily in the morning for 5 days
  Then reduce the dose to complete 10 days of treatment.
- Follow-up in 10 days:
  - consider long-term treatment if the asthma attacks have been occurring for several months.
  - if the patient is already receiving long-term treatment, re-evaluate the severity of the asthma (see table page 72) and adapt treatment accordingly.
- If there is no improvement after 20 to 30 minutes:
  aminophylline IV infusion: give a loading dose of 5 mg/kg diluted in an isotonic solution and infuse over 30 minutes, then reduce the rate to 0.5 to 1 mg/kg/hour according to the clinical evolution.
  Administer with caution to children under 30 months. Do not give a loading dose if the patient has already received aminophylline PO. Change to oral treatment after 24 hours. NEVER administer by direct IV: risk of seizures and cardiac arrest.

Notes:
– In pregnant women, treatment of mild or moderate asthma attacks is the same as above. In the event of a severe attack, avoid using aminophylline, particularly in the third trimester. Administering oxygen reduces the risk of foetal hypoxia.
– For all patients, irrespective of the severity of the asthma attack, look for underlying lung infection and treat accordingly.

Long-term treatment of chronic asthma

Long-term treatment does not mean treatment for life. Asthma attacks may occur over a period of months or years, interspersed with asymptomatic intervals when long-term treatment is no longer useful.

Long-term treatment of asthma according to severity

Severity	Treatment
Intermittent asthma – intermittent symptoms (< 1 time/week) – short attacks – nocturnal asthma < 2 times/month – asymptomatic between attacks	**No long term treatment** Give inhaled **salbutamol** when symptomatic
Mild persistant asthma – symptoms > 1 time/week, but < 1 time/day – attacks may affect activity and sleep – nocturnal asthma > 2 times/month	Continuous anti-inflammatory treatment with inhaled **beclometasone** Give inhaled **salbutamol** when symptomatic
Moderate persistant asthma – daily symptoms – attacks affect activity and sleep – nocturnal asthma > 1 time/week – daily inhalation of salbutamol	Continuous anti-inflammatory treatment with inhaled **beclometasone** + inhaled **salbutamol** (1 puff 4 times/day) If insufficient, add **aminophylline** or **theophylline** PO as below
Severe persistant asthma – frequent attacks – physical activity limited by symptoms – frequent nocturnal asthma	Continuous anti-inflammatory treatment with inhaled **beclometasone** + inhaled **salbutamol** (1 puff 4 to 6 times/day) + **aminophylline** or **theophylline** PO Children over 1 year and adults: 10 to 16 mg/kg/day in 3 divised doses, without exceeding 400 mg/day in children and 800 mg/day in adults

– When starting long-term treatment, it is recommended to precede inhaled corticosteroid treatment with **prednisolone** PO, irrespective of the severity of asthma (mild, moderate or severe).
  Children: 1 to 2 mg/kg once daily in the morning for 7 to 10 days
  Adults: 0.5 to 1 mg/kg once daily in the morning for 7 to 10 days
– Inhaled corticosteroid treatment: the dosage of **beclometasone** vary depending on the severity of asthma. Find the minimum dosage necessary to both control the symptoms and avoid local and systemic adverse effects:
  Children: 50 to 100 micrograms twice daily depending on the severity. Increase to 200 micrograms twice daily if the symptoms are not controlled. In patients with severe chronic asthma the dosage may be as high as 800 micrograms/day.

Adults: start with 250 to 500 micrograms twice daily depending on to the severity. If a total dosage of 1000 micrograms/day (in 2 to 4 divided doses) is ineffective, the dosage may be increased to 1500 micrograms/day, but the benefits are limited. If the increased dosage is still ineffective, add prednisolone PO at the dosages indicated above and continue for 10 days at decreasing dosages.

⚠ The number of puffs depends on the concentration of beclometasone in the inhaled suspension: 50, 100 or 250 micrograms/puff. To avoid dose errors on administration use inhalers of 50 or 100 micrograms/puff for children. Keep inhalers of 250 micrograms/puff for adults.

– In pregnant women, poorly controlled asthma increases the risk of pre-eclampsia, eclampsia, haemorrhage, in utero growth retardation, premature delivery, neonatal hypoxia and perinatal mortality. Long term treatment remains inhaled salbutamol and beclometasone at the usual dosage for adults. Whenever possible, avoid theophillines (particularly during the third trimester) and oral corticosteroids.

– If symptoms are not well controlled during a period of at least 3 months, check the inhalation technique and compliance before changing to a stronger treatment.

– If symptoms are well controlled (the patient is asymptomatic or the asthma has become intermittent) for a period of at least 3 months: reduce the inhaled corticosteroids, salbutamol, the theophyllines (if they were used) and if it seems possible, stop long term treatment. Provide all patients with a salbutamol inhaler for any possible attacks. Evaluate after 2 weeks. If the results are satisfactory, continue for 3 months and then re-evaluate. If the patient has redeveloped chronic asthma, restart long term treatment at an adapted dosages etc.

Tuberculosis

– Tuberculosis (TB) is caused by *Mycobacterium tuberculosis*. Apart from immunocompromised individuals, only 10% of those infected develop the disease.

– Clinical manifestations are varied:
  • pulmonary TB (the most common form and the principal source of transmission): cough lasting more than 3 weeks, haemoptysis, chest pain, deterioration of general condition, moderate fever at night.
  • extra-pulmonary TB: meningeal, disseminated (miliary), lymphatic, osteo-articular, spinal, intestinal, genitourinary.

– HIV infection is a risk factor for the development of tuberculosis. TB is considered to be an opportunistic infection which can reveal AIDS. In certain countries, up to 70% of patients with TB are co-infected with HIV.

Diagnosis

Diagnosis is based on clinical evaluation and detection of acid fast bacillus (AFB) by microscopy. Culture and x-ray play a minor role.

Note: not all patients with haemoptysis have tuberculosis. Consider other aetiologies if the sample is AFB negative: paragonimosis and melioidosis in southeast Asia; deep mycosis: (histoplasmosis); bronchopulmonary cancer.

Treatment

– Treatment is based on a combination of antituberculosis drugs. The essential drugs are: **isoniazid** (H), **rifampicin** (R), **pyrazinamide** (Z), **ethambutol** (E), **streptomycin** (S) and **thioacetazone** (T).

– All treatments that include rifampicin must be administered under direct observation (DOT) by medical personnel or by specifically trained and supervised community members.

– Smear positive patients and patients with severe forms are given priority treatment. For new cases, 'short-course regimens' lasting 6 to 8 months include 2 months of rifampicin-containing quadruple therapy.
  For example: 2 months of **EHRZ** followed by 4 months of **HR** or 6 months of **HE**.

– Certain conditions should be met before starting to treat TB patients:
  • treatment protocols conform to international recommendations
  • a regular follow-up of patients for the duration of treatment is organized
  • a regular, uninterrupted supply of drugs and laboratory reagents is guaranteed
  • a system to actively trace patients who default is in place
  • a system to register patients and treatment results is implemented, including regular analysis of the data

It takes a significant investment to cure a TB patient, both from the patient and the medical team. Only *uninterrupted* treatment of several months will lead to a cure and prevent the development of resistance, which complicates later treatment. It is essential that the patient understands the importance of treatment adherence and has the possibility to follow treatment until it is completed.

Prevention

BCG vaccine administered before a primary infection gives 40% to 80% protection for a period of 10 to 15 years and prevents young children from developing severe forms of the disease (meningitis, miliary tuberculosis). The role of BCG in adults is less clear.

For more information, refer to the MSF handbook, *Tuberculosis*.

CHAPTER 3

Gastrointestinal disorders

Acute diarrhoea

– Acute diarrhoea is defined as at least 3 liquid stools per day for less than 2 weeks.

– There are 2 clinical types of acute diarrhoea:
  • **Simple diarrhoea without blood**, caused by viruses in 60% of cases (rotavirus, enterovirus), bacteria (*Vibrio cholerae*, enterotoxigenic *Escherichia coli*, non-typhi *Salmonella*, *Yersinia enterocolitica*) or parasites (*giardiasis*). Diseases, such as malaria or upper and lower respiratory tract infections, can be accompanied by this type of diarrhoea.
  • **Dysentery** or **bloody diarrhoea**, caused by bacteria (*Shigella* in 50% of cases, *Campylobacter jejuni*, enteroinvasive or enterohaemorrhagic *Escherichia coli*, *Salmonella*) or parasites (intestinal amoebiasis).

– Infectious diarrhoeas are transmitted by direct (dirty hands) or indirect (ingestion of contaminated water or food) contact.

– The high mortality rate from diarrhoeal diseases, even benign, is due to acute dehydration and malnutrition. This can be prevented by adequate rehydration and nutrition.

Clinical signs

– First assess for signs of dehydration. See *Assessment of diarrhoeal patients for dehydration*, WHO, annex 2a, page 331.
– Then look for other signs:
  • profuse watery diarrhoea (cholera, enterotoxigenic *E. coli*),
  • repeated vomiting (cholera),
  • presence of red blood in stools: see *Shigellosis*, page 82 and *Amoebiasis*, page 84,
  • fever (salmonella, viral diarrhoea).
– In a patient over 5 years with severe and rapid onset of dehydration, suspect cholera.

Treatment

General principles:
– Prevent or treat dehydration: rehydration consists of prompt replacement of fluid and electrolyte losses as required, until the diarrhoea stops.
– Administer zinc sulfate to children under 5 years.
– Prevent malnutrition.
– Do not systematically administer antimicrobials: only certain diarrhoeas require antibiotics (see *antimicrobial treatment*, following page).
– Do not administer anti-diarrhoeal drugs or antiemetics.

Prevention of dehydration (outpatient)

Follow *Treatment plan A to treat diarrhoea at home*, WHO, annex 2b, page 332.

Treatment of dehydration

Moderate dehydration (at dispensary level)
Follow *Treatment plan B to treat dehydration*, WHO, annex 2c, page 334.

Severe dehydration (at hospital level)
Follow *Treatment plan C to treat severe dehydration quickly*, WHO, annex 2d, page 336.
- In the event of **hypovolaemic shock** or if there is no improvement after one hour: increase the infusion rate.
- Check for signs of fluid overload: palpebral oedema is the first sign of overhydration. Stop rehydration until oedema disappear.
- If there are signs of acute pulmonary oedema (laryngeal crackles, dyspnoea and increased respiration rate, coughing with or without frothy sputum, distress, bilateral lung crepitations, tachycardia etc.), administer IV **furosemide** immediately and repeat after one to 2 hours if required:
  Children: 1 mg/kg/injection
  Adults: 40 mg/injection

Special situations

- Cholera
  An adult may require up to 10 to 15 litres of **Ringer Lactate** on the first day.
  After 24 hours infusion, particularly if the patient does not start to eat again, there is a risk of hypokalaemia. This can be compensated for by adding 1 to 2 g of **potassium chloride**/litre of Ringer Lactate (1 to 2 ampoules of 10 ml 10% KCl). It is essential to carry out a clinical examination beforehand, and the administration must be monitored carefully (an over-rapid infusion of KCl can be fatal).
- Rehydration and severe malnutrition
  The principle is the same, but the oral rehydration salts used and the volume of fluids required differ from those used for healthy children (see *Severe acute malnutrition*, page 40).

Zinc supplementation (in children under 5 years)

Zinc sulfate is given in combination with oral rehydration solution in order to reduce the duration and severity of diarrhoea, as well as to prevent further occurrences in the 2 to 3 months after treatment:
zinc sulfate PO
Children under 6 months: 10 mg once daily (1/2 tablet once daily) for 10 days
Children from 6 months to 5 years: 20 mg once daily (1 tablet once daily) for 10 days
Place the half-tablet or full tablet in a teaspoon, add a bit of water to dissolve it, and give the entire spoonful to the child.

Prevention of malnutrition

Follow *Treatment plan A to treat diarrhoea at home*, WHO, annex 2b, page 332.

Antimicrobial treatment

Diarrhoea without blood

Most acute diarrhoeas are caused by viruses unresponsive to antimicrobials. Antimicrobials can be beneficial in the event of cholera or giardiasis.

– **Cholera**: the most important part of treatment is rehydration. In the absence of resistance, antibiotic treatment may shorten the duration of illness.
doxycycline PO
Children: 100 mg as a single dose
Adults: 300 mg as a single dose
Note: doxycycline is usually contraindicated in pregnant or breast-feeding women and in children under 8 years. However, for treating (but not preventing) cholera, the administration of a single dose should not, in theory, provoke any adverse effects. Check national recommendations.

– **Giardiasis**: antiparasitic treatment only if cysts or trophozoites of *Giardia lamblia* are found in stools or if the diarrhoea persists for more than 14 days:
metronidazole PO[1]
Children: 15 mg/kg/day in 3 divided doses for 5 days
Adults: 2 g once daily for 3 days or 750 mg/day in 3 divided doses for 5 days

Bloody diarrhoea (dysentery)

– **Shigellosis** is the most frequent cause of dysentery (amoebic dysentery is much less common). If there is no laboratory diagnosis to confirm the presence of amoebae, first line treatment is for shigellosis (see page 82).

– **Amoebiasis:** antiparasitic treatment only if motile *E. histolytica* amoebae are found in stools or if a correct shigellosis treatment has been ineffective (see page 84).

Prevention

– Breastfeeding reduces infant morbidity and mortality from diarrhoea and the severity of diarrhoea episodes.

– When the child is weaned preparation and storage of food are associated with the risk of contamination by faecal micro-organisms: discourage bottle-feeding; food must be cooked well; milk or porridge must never be stored at room temperature.

– Access to sufficient amounts of clean water and personal hygiene (washing hands with soap and water before food preparation and before eating, after defecation etc.) are effective methods of reducing the spread of diarrhoea.

[1] Metronidazole PO can be replaced by tinidazole PO: 50 mg/kg as a single dose, without exceeding 2 g.

Shigellosis

– There are 4 serogroups of shigella: *S. flexneri*, *S. boydii*, *S. sonnei* and *S. dysenteriae*. *Shigella dysenteriae* type 1 (Sd1) is the only strain that causes large scale epidemics. Of the 4 serogroups it has the highest case fatality rate (up to 10%).

– Ciprofloxacin is currently the only effective treatment for shigellosis. It is therefore essential to prevent the development of resistances.

Clinical signs

Bloody diarrhoea with or without fever, abdominal pain and tenesmus, which is often intense.

Patients with at least one of the following criteria have an increased risk of death:

– Signs of serious illness:
  • fever > 38.5°C
  • malnutrition (< 80% of the median)
  • severe dehydration
  • confusion, seizures or coma

– Age groups at risk:
  • children under 5 years
  • adults over 50 years

Treatment

– Antibiotic treatment:
  • **ciprofloxacin** PO is the first line treatment
  Children: 30 mg/kg/day in 2 divided doses for 3 days
  Adults: 1 g/day in 2 divided doses for 3 days
  • in pregnant women, ciprofloxacin is contra-indicated in principle, use **ceftriaxone** IM: 1 g once daily for 3 to 5 days

  Amoxicillin is ineffective in vivo. The use of nalidixic acid favours the development of ciprofloxacin resistance.

– For pain:
  hyoscine butylbromide PO
  Children from 6 to 12 years: 10 mg, to be repeated every 8 hours if necessary
  Adults: 10 to 20 mg, to be repeated every 8 hours if necessary
  All opioid analgesics are contra-indicated as they slow peristalsis.

– Supportive therapy:
  • nutrition: all patients with dysentery should receive nutritional supplements
  2500 kcal/day during hospitalisation
  1000 kcal/day as outpatients
  Children already in nutritional centres should be isolated.
  • rehydration: systematic administration of **ORS** (follow the WHO protocols, annexes 2b, 2c, pages 332 to 335).

– Never give loperamide or any other antidiarrhoeal.
– Complications of shigellosis due to Sd1:
  • septicaemia: see *antibiotic treatment of septic shock* (page 20)
  • acute abdomen: see *antibiotic treatment of septic shock* (page 20) and laparotomy
  • seizures: **diazepam** (page 23) and fluid restriction
  • moderate to severe haemolytic uraemic syndrome, may require transfusion and/or haemodialysis.

Shigellosis in an epidemic context (Sd1)

– Antibiotic resistance develops rapidly (sometimes during the course of an epidemic). After confirming the causal agent, antimicrobial susceptibility should be monitored monthly by culture and sensitivity tests.
– Patients presenting with signs of serious illness or with risk factors are hospitalised for the duration of treatment and are monitored daily (clinically and for compliance).
– Patients with neither signs of serious illness nor risk factors are treated as outpatients. Organise home visits for daily monitoring (clinically and for compliance); hospitalise if the patient develops signs of serious illness.
– Hygiene measures: isolate patients as for cholera, individual and collective hygiene. Shigellosis is an extremely contagious disease (the ingestion of 10 bacteria is infective).

Note: over the past few years, Sd1 epidemics of smaller scale and with lower case fatality rates (less than 1%) have been observed.

Amoebiasis

– Parasitic infection due to the intestinal protozoa *Entamoeba histolytica*. Transmission is faecal-oral (hands, food and water contaminated by stool containing amoebic cysts).
– Usually, ingested cysts release non-pathogenic amoebae and 90% of carriers are asymptomatic.
– In a small number of infected patients, pathogenic amoebae penetrate the mucous of the colon: this is the intestinal form of amoebiasis or **amoebic dysentery**.
– Occasionally, the pathogenic amoebae migrate via the blood stream and form peripheral abscesses. The most common form of extra-intestinal amoebiasis is **amoebic liver abscess**.

Clinical signs

– **Amoebic dysentery**
The clinical picture is similar to that of bacillary dysentery (shigellosis) which is the principal cause of dysentery.
  • diarrhoea or semi-liquid stool with mucous and blood
  • abdominal pain, tenesmus
  • sometimes moderate fever
  • possibly signs of dehydration (see *Assessment of diarrhoeal patients for dehydration*, WHO, annex 2a, page 331).

– **Amoebic liver abscess**
  • hepatomegaly, spontaneous or provoked hepatic pain; rarely jaundice
  • nausea, vomiting
  • intermittent fever, sweating, nocturnal chills; change in overall condition

Laboratory

– **Amoebic dysentery**: identification of mobile trophozoites (*E. histolytica histolytica*) in fresh stool samples
– **Amoebic liver abscess**: indirect haemoagglutination and ELISA

Treatment

– **Amoebic dysentery**
  • The presence of cysts alone should not lead to the treatment of amoebiasis.
  • For patients with intestinal amoebiasis confirmed with a parasitological stool examination:
    tinidazole PO
    Children: 50 mg/kg once daily for 3 days (without exceeding 2 g/day)
    Adults: 2 g once daily for 3 days
    or **metronidazole** PO
    Children: 35 to 50 mg/kg/day in 3 divided doses for 5 to 10 days
    Adults: 1.5 g/day in 3 divided doses for 5 to 10 days
  • If there is no laboratory, first line treatment for dysentery is for shigellosis (see page 82). Only treat for amoebiasis if correct treatment for shigellosis has been ineffective.
  • Oral rehydration salts (**ORS**) if there is risk of, or if there are signs of dehydration (follow the WHO protocols, annexes 2b and 2c, pages 332 to 335).

– **Amoebic liver abscess**
tinidazole PO: follow the same treatment as for dysentery for 5 days.
metronidazole PO: follow the same treatment as for dysentery for 10 to 14 days.

Disorders of the stomach and duodenum

Gastro-oesophageal reflux disease

Clinical signs

Burning stomachache or heartburn, generally relieved by antacids; acid regurgitation (often postural: while sitting forward or lying down). In the absence of dysphagia (oesophageal stenosis), these signs are benign.

Treatment

– First instance, encourage the patient to avoid alcohol and tobacco use.
Give **aluminium hydroxide** PO[1]: 1.5 to 3 g/day in 3 divided doses one hour after meals
or
Instruct the patient to take 500 mg at the time of a painful attack.
– If antacids are insufficient:
omeprazole PO: 20 mg once daily in the morning for 3 days
or, if not available, **cimetidine** PO: 400 mg once daily at bedtime for 3 days
– In small children: no drug treatment, rest and sleep on an incline (30° to 45°).

Peptic ulcer diseases

Clinical signs

Burning epigastric pain or epigastric cramps between meals, that wake the patient at night. They are most characteristic when they occur as episodes of a few days and when accompanied by nausea and even vomiting.
The most common complications are perforation and bleeding.

Treatment of non-complicated ulcers

– For an isolated episode:
  • identify patients taking NSAID or acetylsalicylic acid; stop treatment
  • encourage patients to avoid alcohol and tobacco use
  • **omeprazole** PO: 20 mg once daily in the morning for 7 to 10 days
  or, if not available, **cimetidine** PO: 800 mg once daily at bedtime for 7 to 10 days
– If the patient has frequent recurrences, unrelated to NSAID use, that require repeated treatment with antiulcer drugs: see eradication of *Helicobacter pylori*, next page.

[1] Aluminium hydroxide may decrease absorption of drugs taken at the same time, leave an interval of at least 2 hours between taking aluminium hydroxide and other drugs.

Treatment of complicated ulcers

Perforation

Perforation should be considered in patients presenting with sudden onset intense epigastric pain, particularly if there is rigidity of the abdominal wall. The risk of peritonitis is increased if the perforation occurs on a full stomach.

– To start:
  - place the patient on a strict fast (NPO); insert a nasogastric tube and aspirate if possible
  - place an intravenous line and hydrate (alternate between 5% glucose and Ringer Lactate)
  - **hyoscine butylbromide** IV or IM: 10 to 20 mg, to be repeated every 8 hours if necessary
  - **omeprazole** IV infusion: 40 mg/day over 20 to 30 minutes
    or, if not available, **cimetidine** continuous IV infusion: 1600 mg over 24 hours
– Refer to a surgeon if the patient has eaten during the 6 hours prior to the onset of pain or if there is no improvement within 12 hours despite medical treatment.
– Continue treatment for 3 days then restart oral feeding if the perforation occurred on an empty stomach and if the patient improved during the first 12 hours of treatment. Then start PO treatment to eradicate *Helicobacter pylori* (see further).

Gastrointestinal bleeding

Passing of black stool (maelena) and/or vomiting blood (haematemesis). In 80% of cases the bleeding stops spontaneously.

– Insert a nasogastric tube for aspiration and insert an IV line (16G).

If the haemodynamic state is stable (pulse and blood pressure are normal)
– Hydrate (Ringer Lactate), monitor, keep NPO for 12 hours.
– If there is no active haemorrhage, restart oral feeding after 12 hours.
– Gastric lavage with cold water is not essential, but may help evaluate persistence of bleeding.

If the haemorrhage continues (haematemesis) ***and/or if the haemodynamic state deteriorates*** (pulse increases, BP drops):
– Intensive care and transfusion according to the severity of the bleeding (see *Haemorrhagic shock*, page 19).
– Emergency surgical intervention.

Most peptic ulcers are caused by *Helicobacter pylori* infection. If a diagnosis of ulcer is probable, and the patient has frequent attacks requiring repeated treatment with antiulcer drugs or, in cases of complicated ulcers (perforation or gastrointestinal bleeding) treatment to eradicate *H. pylori* should be considered to prevent relapses.

Once the acute phase has passed, prescribe one of the following treatments:

Treatment of choice (10 days)		Alternative (14 days)
metronidazole PO [2] 1 g/day in 2 divided doses + **amoxicillin** PO 2 g/day in 2 divided doses + **omeprazole** PO 40 mg/day in 2 divided doses	**metronidazole** PO [2] 1 g/day in 2 divided doses + **amoxicillin** PO 2 g/day in 2 divided doses + **bismuth subcitrate** PO 480 mg/day in 4 divided doses	**metronidazole** PO [2] 1 g/day in 2 divided doses + **amoxicillin** PO 2 g/day in 2 divided doses + **cimetidine** PO 1600 mg/day in 2 divided doses

[2] Metronidazole PO can be replaced with tinidazole PO: 1 g/day in 2 divided doses.

Notes:
– Acetylsalicylic acid (aspirin) and NSAID (indometacin, ibuprofen, diclofenac etc) are contra-indicated in patients suffering from or with a history of ulcers.
– Omeprazole is as effective PO as IV.

Dyspepsia

Clinical signs

Epigastric pain or discomfort following meals, often accompanied by bloating, sensation of fullness and nausea. Dyspepsia is most commonly functional, linked with stress and not linked to the quantity of gastric acid (antiacids and antiulcer drugs are ineffective). Resolution is usually spontaneous.

Treatment

If the symptoms persist, short term symptomatic treatment may be considered:
metoclopramide PO in 2 or 3 divided doses 1/2 hour before meals for 2 to 3 days may be helpful particularly in cases of nausea, vomiting, bloating etc.
Children over 20 kg: 0.4 mg/kg/day
Adults: 15 to 30 mg/day

In adults, **hyoscine butylbromide** PO: 30 mg/day in 3 divided doses, 1/2 hour before meals for 2 to 3 days may be helpful, particularly in cases of spasmodic pain.

Note: consider and treat possible intestinal parasites (taeniasis, ascariasis, ancylostomiasis, giardiasis, amoebiasis).

Stomatitis

– Stomatitis is an inflammation of the mucous membranes of the mouth usually of fungal, viral or bacterial origin. It may also be caused by vitamin B or C deficiency or by injury etc.
– Prolonged, painful stomatitis may contribute to malnutrition or dehydration in children: always treat carefully and show the mother how to treat.

Clinical signs and treatment

– Pain, difficulty eating, dysphagia, anorexia, sometimes nausea and vomiting. In a patient with these signs, examine the mucosa of the mouth, particularly in children.
– In all cases: maintain feeding and hydration (use a nasogastric tube for 3 to 4 days, only if pain is preventing the patient from eating) and keep the affected areas clean to prevent secondary infections or recurrence.
– Lesions may persist or there may be recurrence despite correct treatment, particularly in HIV infected patients.

Infectious stomatitis

– **Candidiasis (thrush)**

Infection caused by *Candida albicans*. It occurs frequently in infants, malnourished children and HIV infected patients. White patches on the tongue may spread to cover the whole mouth.

- Clean the mouth with **sodium bicarbonate** 4 times/day (1/2 teaspoon in 250 ml of boiled and then cooled water).
- Apply **nystatin** to the affected area between meals: 4 lozenges of 100 000 IU/day in 4 divided doses for 7 days. Have the patient suck the tablets. For young children crush the tablets before applying to the affected area.
- If nystatin is not available, apply **gentian violet** 2 times/day for 10 days.
- Consider treating for intestinal candidiasis if oral thrush continues despite correct local treatment: **nystatin** PO
  Children: 400 000 IU/day in 4 divided doses for 20 days
  Adults: 2 000 000 IU/day in 4 divided doses for 20 days
- In patients with frequent recurrences consider HIV infection. Do a thorough clinical examination and for treatment, see *HIV infection and AIDS*, page 203.

– **Herpes**

The infection, due to the herpes simplex virus, is very common in children.

Primary infection: very painful lesions, in the form of vesicles, erosions or yellowish ulcerations on the lips and buccal mucosa with general malaise, peripheral lymph swelling and fever.

Recurrence: clusters of vesicles in the nasolabial area (see *Herpes simplex*, page 111).

Both forms of herpes are contagious. Recurrences may be provoked by an infectious disease such as malaria or pneumonia.

- Clean the affected area with a solution of **sodium bicarbonate** + **polyvidone iodine** 4 times/day (preparation: 1/2 teaspoon sodium bicarbonate + 1 teaspoon 10% polyvidone iodine in 250 ml of boiled and then cooled water).
- Treat pain with **paracetamol** PO (see *Pain*, page 28).
- Spontaneous resolution usually occurs within 7 to 10 days. Secondary infections may develop.
- In patients with extensive forms or with frequent recurrences, consider HIV infection. Do a thorough clinical examination and for treatment, see *HIV infection and AIDS*, page 203.

– **Other infectious causes**

See specific treatment for tonsillitis (page 51), diphtheria (page 53), measles (page 181).

For scarlet fever (strawberry tongue associated with a skin rash):
phenoxymethylpenicillin (**pencillin V**) PO for 10 days
Children under 1 year: 250 mg/day in 4 divided doses
Children from 1 to 5 years: 500 mg/day in 4 divided doses
Children from 6 to 12 years: 1 g/day in 4 divided doses
Adults: 2 g/day in 4 divided doses

Stomatitis from vitamin deficiencies

– **Stomatitis from scurvy**

Bleeding gums caused by vitamin C deficiency. In infants it is associated with lower limb pain caused by subperiosteal haemorrhage. It is common in contexts of poor food quality or in populations completely dependent on food aid (refugee camps).

- Clean the mouth and apply **gentian violet** as for candidiasis.
- **ascorbic acid** (**vitamin C**) PO

  Curative treatment for 1 to 2 weeks:
  Children: 100 to 300 mg/day in 2 or 3 divided doses
  Adults: 500 to 1000 mg/day in 2 or 3 divided doses

  Then continue treatment with prophylactic doses:
  Children and adults: 50 to 100 mg/day for as long as required.
- Provide supplementary raw fruits and vegetables.

– **Other stomatitis**

Other vitamin deficiencies may provoke mouth lesions: angular stomatitis of the lips and glossitis from vitamin B2 (riboflavin), niacin (see *Pellagra*, page 113) or vitamin B6 (pyridoxine) deficiencies.
Iron deficiency may also provoke angular stomatitis (see *Anaemia*, page 34).
Give the corresponding vitamins at curative doses; multivitamins are insufficient to treat true vitamin deficiencies.

CHAPTER 4

Skin diseases

Dermatology

Skin diseases, particularly infectious skin diseases, are very common. They must be treated individually or collectively, but must also be considered as indicators of the sanitary condition of a population. A high prevalence of infectious skin diseases may reflect a problem of insufficient water quantity and lack of hygiene in a population.

Dermatological examination

– Observe the type of lesion:
  - **macule**: flat, erythematous, purpuric, pigmented lesion
  - **papule**: elevated, palpable, circumscribed, solid lesion
  - **vesicle** (a few millimeters), **bulla** (a few centimeters): elevation of the skin containing serous fluid
  - **pustule**: elevation of the skin containing pus
  - **scale**: thin flake of epidermis that detaches from the skin surface
  - **crust**: dried residue of serum, pus or blood on the skin surface
  - **abrasion**, **fissure**: erosion that heals without leaving a scar
  - **ulcer**: deep loss of skin surface that leaves a scar
– Look at the location and distribution of the lesions over the body.
– Observe the arrangement of the lesions: isolated, clustered, linear, annular (in a ring).
– Ask if the lesions are itchy and look for the presence of scratch marks.
– Look for a cause: insect bites, scabies, lice and other parasitic skin infections, or a contact allergy (plants, jewelry, animals etc.)
– Ask about any ongoing treatment: topical, oral or injectable.
– Look for local or regional signs (secondary infection, lymphangitis, adenopathy, erysipelas) and/or systemic signs (fever, septicaemia, distant infectious focus).
– Consider the sanitary condition of the family, particularly for contagious skin diseases (scabies, scalp ringworm, lice etc.).
– Check tetanus vaccination status.

Patients with skin disease often present late. At this stage, primary lesions and specific signs may be masked by secondary infection. In these cases, it may be necessary to re-examine the patient, after treating the secondary infection, to identify and treat the underlying skin disease.

Scabies

Scabies is a contagious parasitic skin infection due to *Sarcoptes scabiei hominis*. Human-to-human transmission is by close direct contact and more rarely by indirect contact (sharing of infected clothes or bedding). Overcrowding and lack of hygiene contribute to the spread of scabies.

Clinical signs

Common scabies

– Pruritus with nocturnal predominance, superficial scabious burrows (dark sinuous lines), vesicles, scabious nodules and then urticarial papules and scratch marks.
– The lesions particularly affect the interdigital webs, anterior surface of the wrists and elbows, armpits, buttocks, women's breasts, male genitalia and, in infants, the palms of the hands and the soles of the feet.
– Look for infection in family members.
– Secondary infection resembling pyoderma may occur.

Crusted scabies ("Norwegian" scabies)

– In immunocompromised patients: erythematous scaly eruption over the entire body. This form of scabies is highly contagious as large numbers of mites are present.

Treatment

Local treatment (individual treatment of common scabies)

– Either **benzyl benzoate** lotion

  Children: 12% solution (dilute 25% solution: 1 part water + 1 part 25% benzyl benzoate)
  Adults: full strength 25% solution
  • Apply the solution to the entire body (a broad paint brush can be used), avoiding the face and mucous membranes and the nipples of breastfeeding women. Pay particular attention to the most commonly affected areas. Avoid contact with the eyes.
  • Leave on the skin for 24 hours (12 hours for children under 2 years and pregnant women; 6 hours for infants).
  • Wash and reapply. If possible, change clothes and bedding between applications.

– Or, **5% permethrin** lotion (do not use on infants under 2 months of age)
  • Apply the lotion to the entire body except the face and mucous membranes. Avoid contact with the eyes. Leave for 8 to 12 hours then wash with soap and rinse.

Note: the itching may persist for 1 to 2 weeks after the end of correctly applied topical treatment. This does not mean the treatment was ineffective. To relieve itching, apply **calamine** lotion 2 times/day for a few days.

Irrespective of the scabicide used:

– Simultaneously treat the whole family, whether or not symptomatic.
– Boil all the family bedding and clothing and leave it to dry in the sun. Failing that, leave them in the sun for 72 hours. For non-washable fabric or objects, close them in a plastic bag for 2 to 4 days.
– For patients with secondary bacterial infection: local disinfection or treat with systemic antibiotics depending on the extent of the lesions (see *Impetigo*, page 100). In these cases antibiotic treatment must be started 24 to 48 hours before applying benzyl benzoate or permethrin.

Alternative to topical treatment

Use ivermectin:
– for common scabies:
  • during scabies outbreaks in institutions or refugee camps. Hygiene measures (disinfect floors and surfaces; expose bedding to the sun etc.) must also be implemented.
  Note: prophylactic treatment is not recommended for medical staff, instead increase hand washing.
  • in immunocompromised patients (HIV infected etc.) as first line treatment or in the event of treatment failure after correct topical treatment.

and

– in cases of crusted scabies (in combination with the topical treatment described above). Place patients with crusted scabies in strict isolation, wear protective gloves and gowns when providing care, increase hand washing and disinfect the surroundings.

ivermectin PO
Children over 15 kg and adults: 200 microgrammes/kg as a single dose on an empty stomach.
Ivermectin is not recommended for children less than 15 kg nor pregnant or lactating women (safety not established). Do not use except in real need.

Pediculosis (lice)

– Pediculosis is a contagious parasitic skin infection due to 3 species of lice specific to humans: head lice (*P. h capitis*), body lice (*P. h corporis*) and pubic lice (*P. pubis*).

– Human-to-human transmission of head and pubic lice is most commonly by direct contact and rarely by indirect contact (sharing of combs, contaminated clothing and bedding). Body lice are transmitted either by direct or indirect contact (body lice live in the clothing of the host).

– Only body lice transmit louse-borne relapsing fever (*Borrelia recurrentis*), trench fever (*Bartonella quintana*) and louse-borne typhus (*Rickettsia prowazekii*): see pages 174 and 176.

Clinical signs and treatment

Head lice

– The most common infestation, particularly in children: presence of live lice and/or live nits (eggs) attached to the base of the hair (particularly at the back of the neck and near the ears) and itchy scalp. Scratch marks, eczema and secondary infections may be seen.

– **Treatment**
  • Apply **1% permethrin** lotion or **0.5% malathion** lotion to dry hair (avoid use in infants under 6 months). Leave permethrin for 10 minutes or malathion for 12 hours (8 hours for children from 6 months to 2 years), then wash and rinse thoroughly. If possible, repeat the application after 8 to 10 days.
  • From dry hair, remove the nits by hand or using a fine-toothed comb.
  • Disinfect combs, brushes, hats and bedding (wash at 60°C).
  • For secondary infections: see *Impetigo*, page 100.
  • Examine all contacts and treat those infested.

Notes:
– Prophylactic treatment of contacts (risk of increasing resistant strains) and head shaving are not recommended.
– Lotions are preferred as they are more effective than shampoos.

Body lice

– In populations living in unhygienic conditions (refugees, prisoners, the homeless): itching, urticarial papules, scratch marks (often with secondary infection), on the upper back, around the belt line and in the armpits; presence of lice or nits in the clothing.

– **Treatment of an isolated case**
  Wash with soap; treat household bedding with an insecticide powder (see next page) or wash in 60°C water for 15 to 30 minutes and dry in the sun.

– **Mass treatment** (in the event of body lice, borreliosis or rickettsiosis outbreaks)
Apply **0.5% permethrin** powder to the entire body: 30 g per patient (2 soup spoons; 1 soup spoon = 15 g).
  • In a dressed patient, powder the inside of the clothes (down the front and back, on the neck, inside the belt, sleeves and socks). If a hand powder blower is not available, manually rub the powder between the clothing and the skin to ensure complete coverage. Leave for 12 to 24 hours.
  • Also treat clothing (including hats) and household bedding. Place them in a plastic bag with **0.5% permethrin** powder, or if not available, with **0.3% lindane** powder.
  • Repeat after 8 to 10 days if the infestation persists.

Pubic lice

– In adults, most commonly from sexual contact (not exclusively): itchy pubic area and other hairy areas (armpits, abdomen, thighs, face; eyelashes in children). It is difficult to see the lice and nits. Secondary infection may develop. Always look for an associated sexually transmitted infection (STI).

– **Treatment**
  • Shave the affected area and/or apply **1% permethrin** lotion to all hairy areas (as for head lice).
  • Simultaneous treatment of partners is recommended.
  • Treat any STI if present (see page 219).
  • For secondary infections: see *Impeti*go, page 100.

Prevention

– Wash laundry in 60°C water and then iron or dry in the sun to eliminate lice and nits.

– Increase individual and community hygiene, reduce overcrowding.

Superficial fungal infections

Benign fungal infections of the skin, scalp and nails caused by *Candida albicans* and dermatophytes (tinea).

Clinical signs and treatment

Candidiasis

– **Diaper dermatitis**: erythema of the perineum with peripheral desquamation and sometimes pustules. Secondary infection may develop.
  • Clean the skin with ordinary soap and water, dry well and apply **gentian violet** 2 times/day for 2 to 3 weeks according to the clinical evolution (for preparation, see page 246). Do not use Whitfield's ointment.
  • Avoid humidity: remove plastic pants and diapers, expose the buttocks to air.
  • If diaper dermatitis is severe and persistent despite correct local treatment, treat as an intestinal infection (**nystatin** PO: 400 000 IU/day in 4 divided doses for 20 days).

– **Other candidiases**: of the dermal folds (treat as above), of the mouth (see *Stomatitis*, page 88), of the vagina (see *Sexually transmitted infections*, page 219).

Dermatophytoses (ringworm)

– **Scalp ringworm**: mainly in children.
  Depending on the species:
  – one or more round, scaly, erythematous plaques with the ends of broken hairs
  – inflammation, suppuration, crusting and peripheral lymphadenopathy (kerion);
  – permanent hair loss (favus).
  • Shave the hair, clean with **chlorhexidine + cetrimide** 2 times/day (for preparation, see page 246) and apply **Whitfield's ointment** 2 times/day for at least 2 weeks and if necessary for the entire duration of treatment with griseofulvin.
  • **griseofulvin** PO
  Children: 10 to 20 mg/kg/day in 1 or 2 divided doses for 6 weeks
  Adults: 500 mg to 1 g maximum/day in 1 or 2 divided doses for 6 weeks
  Treatment may last up to 12 weeks in severe infections.
  • For painful kerion: **paracetamol** PO (see *Pain*, page 28).
  • For infected scalp ringworm: treat the secondary infection before applying Whitfield's ointment (see *Impetigo*, page 100).
  • Some scalp ringworms are contagious: simultaneously examine and treat symptomatic contacts.

– **Ringworm of the body** (of glabrous skin): erythematous, scaly, pruritic macule with a well-demarcated, raised, vesicular border and central healing.
  • Clean with **chlorhexidine + cetrimide** 2 times/day, dry well and apply **Whitfield's ointment** 2 times/day for 3 weeks if the lesions are not very extensive .
  • Keep griseofulvin PO for extensive lesions (at least 4 weeks of treatment).

– **Other dermatophytoses**
  – Ringworm of the foot (athlete's foot): pruritus, fissures and whitish scales in the 3rd and/or 4th interdigital spaces (these differ from *Candida albicans* lesions which are usually in the 1st and 2nd interdigital spaces).
  – Ringworm of the groin: circumscribed, pruritic, erythematous plaque, with a pale centre surrounded by vesiculo-pustules, extending outward from the groin.
  • Clean with **chlorhexidine + cetrimide** 2 times/day, dry well and apply **Whitfield's ointment** 2 times/day for 3 weeks.
  • If the lesions ooze, apply **gentian violet** 2 times/day before starting treatment with Whitfield's ointment.

Note: fungal infections of the fingernails and toenails due to *Candida albicans* and dermatophytes require 12 to 18 months of oral treatment which, in practice, is difficult.

Bacterial skin infections

Impetigo

– Impetigo is a benign, contagious infection of the epidermis due to group A ß-haemolytic streptococcus and *Staphylococcus aureus*. Co-infection is common. Transmission is by direct contact. Lack of water and poor hygiene increase spread.
– Primary infections are most common in children. Secondary infections complicating pre-existing pruritic dermatoses (lice, scabies, eczema, herpes, chickenpox etc.) are more common in adults.

Clinical signs

– Classic form: flaccid vesicule on erythematous skin which becomes pustular and forms a yellowish crust. Different stages of the infection may be present simultaneously. The lesion does not leave a scar. The most common sites of infection are around the nose and mouth, on the limbs or on the scalp. There is no fever.
– Bullous impetigo: large flaccid bullae and erosions of the skin in the ano-genital region in newborns and infants.
– Ecthyma: an ulcerative form of impetigo that leaves scars. Lesions usually occur on the lower limbs. This form is most common in the immunocompromised, diabetics and alcoholics.
– Rare complications:
  • abscess, pyodermitis, lymphangitis, osteomyelitis, septicaemia;
  • systematically look for signs of acute glomerulonephritis.

Treatment

– ***Localised impetigo*** (less than 3 lesions on the same region of the body):
  • Clean with **chlorhexidine + cetrimide** 2 times/day, dry, gently remove the crusts and then apply **gentian violet** (for preparation, see page 246).
  • Soften crusts if necessary by applying **zinc oxide ointment**.
  • Keep dry (do not cover with an occlusive dressing; if on the buttocks of children, leave uncovered, etc.).
  • Keep fingernails short.
– ***Extensive impetigo*** (more than 3 lesions or impetigo on more than one region of the body), bullous impetigo, ecthyma, abscess; immunocompromised patient:
  • Treat locally as above.
  • Incise abscesses.
  • Treat systematically with antibiotics:
    cloxacillin PO
    Children: 50 mg/kg/day in 2 divided doses for 10 days
    Adults: 2 g/day in 2 divided doses for 10 days
    For patients allergic to penicillin: **erythromycin** PO
    Children: 30 to 50 mg/kg/day in 2 or 3 divided doses for 10 days
    Adults: 2 to 3 g/day in 2 or 3 divided doses for 10 days

– ***For all patients*:**
  - Quarantine from school.
  - Treat any pre-existing skin disease: lice (see page 96), scabies (see page 94), eczema (see page 112), herpes (see page 111), scalp ringworm (see page 98), or an ENT infection (see Chapter 2).
  - Trace and treat contacts.
  - Systematically check for proteinuria (use a reagent strip) 3 weeks after the infection.

Furuncles (boils) and carbuncle

A necrotising perifollicular infection, usually due to *Staphylococcus aureus*. Development is favoured by humidity, breaks in the skin, lack of hygiene, diabetes mellitus, malnutrition, iron deficiency or compromised immunity.

Clinical signs

– Furuncle: red, warm, painful nodule with a central pustule, usually around a hair follicle. It becomes fluctuant, discharges a core of purulent exudate, and leaves a depressed scar. It occurs most frequently on the thighs, groin, buttocks, armpits, neck and back. There is no fever.
– Carbuncle: a cluster of interconnected furuncles, sometimes with fever and peripheral adenopathies. It leaves a depressed scar.

Treatment

– For a single furuncle:
  Apply chorhexidine + cetrimide 2 times/day and cover with a dry dressing.
– For furuncles on the face, carbuncles, multiple furuncles (furunculosis) or in immunocompromised patients, treat systematically with antibiotics:
  cloxacillin PO
  Children: 50 mg/kg/day in 2 divided doses for 8 days
  Adults: 2 g/day in 2 divided doses for 8 days
  For patients allergic to penicillin:
  erythromycin PO
  Children: 30 to 50 mg/kg/day in 2 or 3 divided doses for 8 days
  Adults: 2 to 3 g/day in 2 or 3 divided doses for 8 days
– Excise the furuncle only when it becomes fluctuant.
– For all cases:
  - Daily cleaning, frequent hand washing, wash bedding;
  - Never manipulate a furuncle on the face as there is a risk of serious complication: unilateral facial inflammation with high fever and risk of cavernous sinus thrombosis. In this case treat with:
    cloxacillin slow IV
    Children: 75 mg/kg/day in 3 injections
    Adults: 3 g/day in 3 injections
    Change to oral treatment as soon as possible, at the same doses, to complete 10 days of treatment.

Or, for patients allergic to penicillin: **chloramphenicol** IM
Children over 2 months: 100 mg/kg/day in 3 injections
Adults: 3 g/day in 3 injections
Change to oral treatment as soon as possible, at the same doses, to complete 10 days of treatment.

Erysipela

Erysipela is an acute non-necrotising hypodermal infection, due to group A streptococcus. Common in adults, rare in children.

Clinical signs

- Painful, inflammatory, oedematous plaque on a lower limb, high fever, peripheral adenopathies and lymphangitis).
- May occur on the face: bilateral, oedematous plaques, with peripheral swelling.
- Look for a cutaneous portal of entry: ulcer, wound, intertrigo.
- Local complications: most commonly superficial abscess, sometimes deep abscess (secondary staphylococcal infection), rarely develops into necrotising faciitis.
- Rare generalised complications: septicaemia, acute glomerulonephritis, erythema nodosum.

Treatment

- **benzylpenicillin procaine** IM
  Children: 50 000 IU/kg once daily
  Adults: 1.5 MIU once daily
  until the fever disappears and there is clinical improvement, then change to oral treatment to complete 7 to 10 days of treatment with:
  phenoxymethylpenicillin (**penicillin V**) PO
  Children under 1 year: 250 mg/day in 4 divided doses
  Children from 1 to 5 years: 500 mg/day in 4 divided doses
  Children from 6 to 12 years: 1 g/day in 4 divided doses
  Adults: 2 g/day in 4 divided doses
  or
  amoxicillin PO: 50 mg/kg/day in 2 or 3 divided doses

  For patients allergic to penicillin: **erythromycin** PO
  Children: 50 mg/kg/day in 2 or 3 divided doses for 7 to 10 days
  Adults: 3 g/day in 3 divided doses for 7 to 10 days
- Hospitalise patients who show marked generalised signs, signs of local complications, patients in poor general condition (chronic disease, the elderly) or if there is a risk of non-compliance during outpatient treatment.
- *Note*: other bacteria (*Staphylococcus aureus*, Gram negative bacteria) may cause acute cellulitis resembling erysipela. In the event of treatment failure with penicillin, consider these infections and change to **amoxicillin** + **clavulanic acid** (**co-amoxiclav**).

– For all patients:
  • Bed rest with the affected leg elevated.
  • Non-steroidal anti-inflammatory drugs (NSAID) are contra-indicated (risk of necrotising fasciitis).
  • Treat the portal of entry (ulcer, wound, intertrigo).
  • Systematically check for proteinuria, on reagent strip, 3 weeks after the infection.

Necrotising infections of the skin and soft tissue

Necrosis of the hypodermis, with a vascular thrombosis, and sometimes a necrosis of the underlying superficial aponeurosis (fasciitis) and secondarily necrosis of the dermis. The clinical picture varies depending on the causal bacteria, most often Group A streptococcus, commonly associated with other bacteria (*Staphylococcus aureus*, anaerobic, enterobacteria, enterococcus).

Clinical signs

Intensely painful, poorly demarcated, erythematous plaque with oedema and severe septic syndrome. Some patients then develop hemorrhagic blisters and bluish or blackish, cold, hypoaesthetic spots. The presence of gas or crepitation on palpation is linked to certain bacteria (*Clostridium perfringens*, enterobacteria).

Treatment

In case of necrotising fasciitis or gas gangrene: refer.

– Urgent surgical drainage of the wound and excision of the necrotic tissue.

– Antibiotic treatment (the length of treatment varies according to the clinical evolution):
  • **Necrotising fasciitis:**
    benzylpenicillin IV
    Children: 600 000 IU (360 mg)/kg/day in 6 injections or infusions given every 4 hours
    Adults: 24 MIU (14.4 g)/day in 6 injections or infusions given every 4 hours
    +
    clindamycin IV
    Children: 40 mg/kg/day in 3 infusions given every 8 hours (maximum 1.3 g/day)
    Adults: 1.8 g/day in 3 infusions given every 8 hours
  • **Gas gangrene:**
    benzylpenicillin IV: as above
    +
    metronidazole IV
    Children: 30 mg/kg/day in 3 infusions given every 8 hours (maximum 1.5 g/day)
    Adults: 1.5 g/day in 3 infusions given every 8 hours
    +
    gentamicin IM
    Children and adults: 3 to 6 mg/kg/day in 2 injections

Cutaneous anthrax

– A toxic infection of herbivores due to *Bacillus anthracis* that is transmitted to humans by inoculation through the skin (contact with infected dead animals, flies). Cutaneous anthrax is common in the tropics.

– Pulmonary (transmitted by inhalation) and intestinal (transmitted by eating infected meat) forms also exist.

Clinical signs

– Papule, then pruritic vesicle that ulcerates and becomes a black eschar surrounded by significant oedema with lymphangitis, regional adenopathy and/or generalised signs. Cutaneous anthrax usually occurs on uncovered areas of the body (head, neck, limbs) and is painless.

– If not treated promptly, there is a risk of extensive, malignant oedema and septicaemia.

Treatment

– **Simple cutaneous anthrax** (at dispensary level):

  • Antibiotic treatment:

  phenoxymethylpenicillin (**penicillin V**) PO
  Children under 1 year: 250 mg/day in 4 divided doses for 7 to 10 days
  Children from 1 to 5 years: 500 mg/day in 4 divided doses for 7 to 10 days
  Children from 6 to 12 years: 1 g/day in 4 divided doses for 7 to 10 days
  Adults: 2 g/day in 4 divided doses for 7 to 10 days

  For patients allergic to penicillin:
  doxycycline PO (except for children under 8 years and pregnant or lactating women)
  Children over 8 years and adults: 200 mg/day in 2 divided doses for 7 to 10 days
  or
  erythromycin PO
  Children: 30 to 50 mg/kg/day in 2 or 3 divided doses for 7 to 10 days
  Adults: 2 to 3 g/day in 2 or 3 divided doses for 7 to 10 days

  • Do not excise the eschar. Daily dry dressings.

– **Cutaneous anthrax with extensive oedema or generalised signs or cutaneous anthrax localised on the head or neck** (at hospital level):

  benzylpenicillin procaine + benzylpenicillin or **benzylpenicillin procaine** IM
  Children: 100 000 IU/kg/day in 1 or 2 injections
  Adults: 4 MIU/day in 1 or 2 injections

Change to oral treatment as soon as possible with **phenoxymethylpenicillin** (**penicillin V**) PO to complete 10 days of treatment:
Children under 1 year: 250 mg/day in 4 divided doses
Children from 1 to 5 years: 500 mg/day in 4 divided doses
Children from 6 to 12 years: 1 g/day in 4 divided doses
Adults: 2 g/day in 4 divided doses

For patients allergic to penicillin:
chloramphenicol IV
Children: 100 mg/kg/day in 3 injections
Adults: 3 g/day in 3 injections
Change to oral treatment as soon as possible with **chloramphenicol** PO at the same doses to complete 10 days of treatment.

Prevention

– Antibiotic prophylaxis for adult contacts:
doxycycline PO (except for pregnant and lactating women): 200 mg/day for 6 weeks
– Bury or burn the carcasses of animals that die of anthrax.

Treponematoses

– Bacterial infections caused by 3 different types of treponema (other than *Treponema pallidum*).
– Human-to-human transmission may be direct or indirect.
– The 3 non-venereal treponematoses result in positive syphilis serology (TPHA-VDRL), but this test is not necessary as diagnosis is clinical.
– For treatment of syphilis see *Sexually transmitted infections*, page 219.

Clinical signs

See table following page.

Treatment

– ***For the 3 treponematoses***

benzathine benzylpenicillin IM
Children under 6 years: 600 000 IU as a single injection
Children over 6 years and adults: 1.2 MIU as a single injection

For patients allergic to penicillin:
erythromycin PO
Children: 50 mg/kg/day in 2 or 3 divided doses for 14 days
Adults: 2 to 3 g/day in 2 or 3 divided doses for 14 days
or
doxycycline PO (except for children under 8 years and pregnant and lactating women)
Children over 8 years: 100 to 200 mg once daily or in 2 divided doses for 14 days
Adults: 200 mg once daily or in 2 divided doses for 14 days

Notes:
- Antibiotic treatment will cure early stage cases and may relieve the pain of osteitis. It may be ineffective for late stage infections.
- Syphilis serology will remain positive despite clinical cure.

– ***Prophylactic treatment of contacts***

Examine contacts and treat with **benzathine benzylpenicillin** IM as a single dose as above (also treat patients in the latent stage with positive serology in endemic zones).

Clinical signs of treponematoses

	YAWS	PINTA	BEJEL (endemic syphilis)
Pathogen	*Treponema pertenue*	*Treponema carateum*	*Treponema pallidum* type M
Geographic distribution	Tropical and humid forests	Tropical zones of Latin America	Arid areas, semi-desert of the Middle East and Africa
Population	Children between 4 and 14 years	Children and adults	Nomadic populations, particularly children
First stage	Yaws chancre: skin coloured lesion, non-indurated, itchy, on the lower limbs in 95% of cases, with peripheral adenopathy. Spontaneous healing or development of a large yaw surrounded by smaller yaws.	Annular, erythematous, scaly plaques, usually on uncovered body parts (face, extremities), resemble dermatophytes. Lesions heal spontaneously leaving scars.	Discrete chancre: moist papule, most commonly on the mucous membranes or in dermal folds, with peripheral adenopathy.
Second stage	Lesions appear 3 weeks after the initial chancre, occur in crops and heal spontaneously: – frambesioma (papillomatous lesion, vegetal, very contagious) – isolated or associated with yaws (round, squamous papules, not very contagious) – osteoperiostitis of the long bones (phalanges, nasal process of the maxilla, tibia)	Pintids: plaques of various colours (bluish, reddish, whitish). May occur anywhere on the body.	– mucous patches of the mouth common: very contagious ulcerated, round in form, indurated, with white coating, bleed easily, usually occur on the inside of the lips, cheek and tongue or labial folds – condyloma in the anogenital region (rare) – cutaneous lesions are rare: vegetal aspect, in dermal folds – bone destruction identical to that of yaws, in the legs and forearms
Late stage	After some years of latency: periostitis; painful, debilitating osteitis; ulcerating and disfiguring rhinopharyngitis; juxta-articular nodules	Symmetrical white patches on the limbs. The depigmentation is permanent, remaining after treatment.	After several years of latency: – gummatous lesions of skin and long bones – plantar and palmar keratosis – juxta-articular nodules – hyper- and hypo-pigmented patches (as in pinta)

Leprosy (Hansen's disease)

An endemic, chronic bacterial infection due to *Mycobacterium leprae*. Humans are the only reservoir of proven significance. Leprosy is not very contagious with transmission through prolonged, close, direct contact, particularly between household members. Children are most at risk of contracting the disease.

Clinical signs

Leprosy should be considered in any patient presenting with hypopigmented skin lesions or peripheral neuropathy. In suspect cases, conduct a thorough clinical examination:
– skin and mucous membranes (patient must be undressed)
– neurological examination: sensitivity to light touch, pinprick and temperature (hot-cold test)
– palpation of the peripheral nerves

Different clinical forms and classification of leprosy exist.
The Ridley-Jopling classification differentiates 5 forms based on several factors, including the bacteriological index.
The WHO clinical classification is simplified to include only 3 forms (see next page)

The Ridley-Jopling classification of leprosy

Paucibacillary forms (least contagious forms)			**Multibacillary forms** (most contagious forms)	
Tuberculoid	Borderline Tuberculoid	Borderline	Borderline Lepromatous	Lepromatous
T.T.	B.T.	B.B.	B.L.	L.L.

Tuberculoid leprosy

– The primary characteristic is peripheral nerve involvement: tender, infiltrated and thickened nerves; loss of thermal, then tactile and pain sensation. This may lead to trophic ulcers and mutilations of the extremities.
– Lesions are single or few in number:
  • plaque with a well-demarcated raised border and an atrophic, clear centre
  or
  • erythematous macule on pale skin, hypopigmented macule on dark skin
– Nerve involvement develops late in the disease.

Lepromatous leprosy

– The primary characteristic is multiple muco-cutaneous lesions:
  • macules, papules or infiltrated nodules on the face, ear lobes and the upper and lower limbs. Lesions are bilateral, symmetrical, pigmented. Initially, there is no sensory loss.
  • involvement of the nasal mucosa with crusting and nose bleeds
  • oedema of the lower limbs
– Nerve involvement develops late in the disease.

Borderline leprosy

Forms between tuberculoid and lepromatous.

Indeterminate leprosy (I)

Form that does not fall in the Ridley-Jopling classification, frequent in children: a single well-demarcated macule, hypopigmented on dark skin, slightly erythematous on pale skin. Absence of sweat and hair, and loss of sensation are inconstant.
Lesion heals spontaneously or the disease evolves towards tuberculoid or lepromatous leprosy.

Lepra reactions

- *Reversal reactions*: occur in patients with borderline leprosy, during treatment, when evolving towards tuberculoid leprosy. Skin lesions become swollen and painful with a risk of necrosis and ulceration. Acute painful neuritis (ulnar nerve) requires urgent treatment (see page 110) as there is a risk of permanent sequelae.
- *Downgrading reactions*: occur in untreated patients with borderline leprosy, when the disease evolves towards lepromatous leprosy. These reactions are difficult to distinguish from reversal reactions.
- *Erythema nodosum leprosum*: crops of tender subcutaneous nodules, purplish-red, then yellowish in colour. This reaction is seen exclusively in patients with lepromatous leprosy during the first year of treatment.

In order to simplify diagnosis and to promote rapid implementation of treatment, the WHO simplified clinical classification of leprosy and differentiates only 3 forms:
- Multibacillary leprosy: more than 5 skin lesions
- Paucibacillary leprosy: 2 to 5 skin lesions
- Single skin lesion paucibacillary leprosy

Laboratory

Demonstration of acid-fast bacilli in a Ziehl-Neelsen stained smear:
- nasal smear
- skin-split smear taken from the ear lobe or from a skin lesion

In tuberculoid leprosy, bacilli are usually not found.

Treatment

Treatment of leprosy

- Leprosy is a curable disease. Early antibiotic treatment prevents functional sequelae and transmission of the disease.
- In countries where leprosy is endemic, it is important to be informed about national control programmes.
- The high rates of resistance and of recurrences after single drug therapy have led to the use of effective multi-drug therapy regimens which are easy to administer in the field and for which no resistance has been reported.
- Teach the patient to recognise and quickly report a lepra reaction or relapse in order to modify or restart treatment.

Treatment recommended by the WHO, based on the simplified clinical classification of leprosy

	Multibacillary leprosy (more than 5 skin lesions)	**Paucibacillary leprosy (2 to 5 skin lesions)**	**Paucibacillary leprosy (single skin lesion)**
Children under 10 years	**dapsone** PO: 25 mg once daily, self-administered + **rifampicin** PO: 300 mg once monthly, under supervision + **clofazimine** PO: 100 mg once monthly, under supervision and 50 mg 2 times weekly, self-administered	**dapsone** PO: 25 mg once daily, self-administered + **rifampicin** PO: 300 mg once monthly, under supervision	
Children between 10 and 14 years	**dapsone** PO: 50 mg once daily, self-administered + **rifampicin** PO: 450 mg once monthly, under supervision + **clofazimine** PO: 150 mg once monthly, under supervision and 50 mg on alternate days, self-administered	**dapsone** PO: 50 mg once daily, self-administered + **rifampicin** PO: 450 mg once monthly, under supervision	
Adults	**dapsone** PO: 100 mg once daily, self-administered + **rifampicine** PO: 600 mg once monthly, under supervision + **clofazimine** PO: 300 mg once monthly, under supervision and 50 mg once daily, self-administered	**dapsone** PO: 100 mg once daily, self-administered + **rifampicine** PO: 600 mg once monthly, under supervision	**rifampicin** PO: 600 mg + **ofloxacin** PO: 400 mg + **minocycline** P : 100 mg
Duration	12 months	6 months	single dose

Treatment of leprosy reactions

– Reversal or downgrading reactions: **prednisolone** (or **prednisone**) PO: 1 mg/kg/day for 3 to 5 days then progressively decrease the dosage (reduce the dosage by 10% each week).
– Erythema nodosum leprosum: **clofazimine** PO, 100 to 300 mg/day associated with an NSAID (do not administer dosages equal to or greater than 300 mg/day for more than 3 months).

Herpes simplex and herpes zoster

Herpes simplex

Recurrent viral infection of the skin and mucous membranes due to the *herpes simplex virus*. Recurrent lesions have a different presentation than primary infection.

Clinical signs

– Recurrent herpes labialis: tingling feeling followed by an eruption of vesicles on an erythematous base, located on the lips ('fever blisters') and around the mouth, they may extend onto the face. Recurrence corresponds to a reactivation of the latent virus after a primary infection. No associated malaise, adenopathy or fever.
– Carefully consider other sites: buccal (page 88), genital (page 226), ophthalmic, and secondary bacterial infections.

Treatment

– Clean with **chlorhexidine + cetrimide** 2 to 3 times/day (for preparation, see page 246) until the lesions have healed.
– For patients with secondary bacterial infections: antibiotic treatment as for impetigo (see page 100).

Herpes zoster (shingles)

Acute viral infection due to the varicella-zoster virus. Chickenpox is the primary infection and herpes zoster the reactivation of the latent virus.

Clinical signs

– Unilateral neuralgic pain followed by an eruption of vesicles on a erythematous base, that follow the distribution of a nerve pathway.
– Lesions most commonly occur on the thorax, but herpes zoster may also develop on the face with a risk of ophthalmic complications.
– Herpes zoster is more common in adults than in children.

Treatment

– Similar to that of herpes simplex, with the addition of systematic analgesics: **paracetamol** PO (see *Pain*, page 28).
– **aciclovir** PO given within the first 48 hours after the eruption of lesions is only indicated for severe forms: necrotic or extensive lesions or lesion on the face which may spread to the eyes (see *HIV infection and AIDS*, page 208).

Other skin disorders

Eczema (dermatitis)

– Acute eczema: erythematous plaque, pruritic, vesicular, oozing, with poorly demarcated and crumbly borders.
– Chronic eczema: erythematous plaque, scaly, dry, poorly demarcated and pruritic.
– Look for a cause (contact allergic dermatitis, fungal or bacterial infection with a distant focus, malnutrition) and ask about family history.

Treatment

– Clean with **chlorhexidine + cetrimide** 2 times/day (for preparation, see page 246).
– Then apply:
  • for acute eczema: **calamine** lotion 2 times/day
  • for chronic eczema: **zinc oxide ointment** 2 times/day
– Look for and treat any pre-existing skin disease (scabies, lice etc.).
– For patients with secondary infections: treat as impetigo (see page 100).
– For patients with intense pruritus:
  promethazine PO
  Children from 2 to 5 years: 5 to 15 mg once daily or in 2 divided doses
  Children from 5 to 10 years: 10 to 25 mg once daily or in 2 divided doses
  Children over 10 years and adults: 25 to 50 mg once daily or in 2 divided doses

  or **chlorphenamine** PO
  Children from 2 to 5 years: 1 mg to be repeated 4 to 6 times daily without exceeding 6 mg/day
  Children from 6 to 12 years: 2 mg to be repeated 4 to 6 times daily without exceeding 12 mg/day
  Adults: 4 mg to be repeated 4 to 6 times/day without exceeding 24 mg/day

Urticaria

– Papules: transient, erythematous, oedematous, pruritic, resembling nettle stings.
– Look for a cause: food or drug (particularly antibiotic) allergy, insect bites; the invasive stage of a bacterial or parasitic infection (ascariasis, strongylodiasis, ancylostomiasis, schistosomiasis, loiasis), viral infection (hepatitis B or C); generalised disease (cancer, lupus, dysthyroidism, vasculitis).

Treatment

– If the pruritus is intense, antihistamines (**promethazine** PO or **chlorphenamine** PO at the dosages indicated above) for a minimum of 7 days.

– For patients with Quincke's oedema:
epinephrine (**adrenaline**) IM
Infants and children: 0.01 mg/kg/injection
Adults: 0.25 to 0.75 mg/injection
to be repeated every 5 minutes if necessary according to the clinical evolution

give with **hydrocortisone** IM
Children: 2 to 4 mg/kg/injection
Adults: 100 to 500 mg/injection

– In the event of anaphylactic shock, see *Shock*, page 19.

Pellagra

Pellagra is a dermatitis resulting from niacin and/or tryptophane deficiency (in persons whose staple food is sorghum, maize not treated with lime; patients with malabsorption, or during famine).

Clinical signs

Classically, disease of the 'three Ds': dermatitis, diarrhoea and dementia.

– Dark red plaques, well demarcated, symmetric, located on exposed areas of the body (forehead, neck, forearms, legs). The skin becomes very scaly, pigmented, sometimes with haemorrhagic bullae.

– Gastrointestinal (glossitis, stomatitis and diarrhoea) and neuropsychiatric symptoms are seen in more serious forms.

Traitement

– **nicotinamide** PO
Children and adults: 300 to 500 mg/day in 2 divided doses, give with a diet rich in protein until the patient is fully cured.

– In the event of an epidemic of pellagra, for example in a refugee camp, it is vital that the food ration be modified (add groundnuts or dry vegetables) in order to meet the daily requirements (approximately 15 mg/day for adults).

CHAPTER 5

Eye diseases

Xerophthalmia (vitamin A deficiency)

– Vitamin A deficiency results in an impaired immune response (increased susceptibility to, and severity of, infections) and may cause xerophthalmia, which can progress to total blindness if left untreated.

– Vitamin A deficiency and xerophthalmia affect mainly children (particularly those suffering from malnutrition or measles) and pregnant women in endemic areas. Vitamin A deficiency can be prevented by the systematic administration of retinol.

Clinical signs (according to the WHO classification)

– The first sign is hemeralopia, or night blindness (the child cannot see in dim light, may bump into objects and/or show decreased mobility).

– Other signs appear gradually:
  • Conjunctival xerosis: conjunctiva becomes dry, dull, thick, wrinkled and insensitive.
  • Bitot's spots: greyish foamy patches on the exposed bulbar conjunctiva appears, often in both eyes (specific sign, however not always present).
  • Corneal xerosis: cornea becomes dry, dull and rough.
  • Corneal ulcerations appear, with risk of secondary infection.
  • Keratomalacia is the last and most severe sign of xerophthalmia, characterised by softening of the cornea, followed by perforation of the eyeball and permanent blindness (extreme care must be taken during ophthalmic examination at this stage, due to risk of rupturing cornea).

Treatment

It is essential to recognise and treat early symptoms to avoid the development of severe complications. Vision can be saved provided that ulcerations affect less than a third of the cornea and the pupil is spared. Even if deficiency has already led to keratomalacia and irreversible loss of sight, it is imperative to administer treatment, in order to save the other eye and the life of the patient.

retinol (**vitamin A**) PO

– Regardless of the clinical stage:
  Children from 6 to 11 months (or under 8 kg): 100 000 IU once daily on D1, D2 and D8
  Children over 1 year (or over 8 kg): 200 000 IU once daily on D1, D2 and D8
  Adult (except pregnant women): 200 000 IU once daily on D1, D2 and D8
  Infants under 6 months: 50 000 IU once daily on D1, D2 and D8 if needed. However vitamin A deficiency is rare in breast fed children.

– In pregnant women, treatment varies according to the stage of illness:
  • Night blindness or Bilot's spots: 10 000 IU once daily or 25 000 IU once weekly for at least 4 weeks. Do not exceed this dosage (potential teratogenic risk).
  • If the cornea is affected, risk of blindness outweighs teratogenic risk. Administer 200 000 IU once daily on D1, D2 and D8.

– Cornea lesions are a **medical emergency**. In addition to the immediate administration of vitamin A, local treatment, as for bacterial conjunctivitis, is needed (see *Conjunctivitis*, page 119).

Prevention

– Systematically administer **retinol** PO to children suffering from measles (one dose on D1, D2, and D8) or malnutrition (single dose).

– In areas where vitamin A deficiency is common:

- Routine supplementation of **retinol** PO
  Children from 6 to 11 months: 100 000 IU as a single dose every 4 to 6 months
  Children from 1 to 5 years: 200 000 IU as a single dose every 4 to 6 months
  Mothers after giving birth: 200 000 IU as a single dose within one month of delivery
- Consumption of foods rich in vitamin A (fruits, vegetables, greens, red palm oil, meat, liver, milk, eggs).
- Consumption of foods fortified with vitamin A.

Note: to avoid excessive dosages, record any doses administered on the health/immunisation card and do not exceed indicated doses. Vitamin A overdose may cause raised intracranial pressure (resulting in bulging fontanelle in infants), headache, nausea, vomiting, and even impaired consciousness and convulsions. These adverse effects are transient, they require medical surveillance and symptomatic treatment if needed.

Conjunctivitis

Conjunctivitis is an acute inflammation of the conjunctiva due to a bacterial or viral infection, allergy, or irritation. Endemic or epidemic, conjunctivitis may be associated with measles or rhinopharyngitis in children. In the absence of hygiene and effective treatment, secondary bacterial infections may develop, affecting the cornea (keratitis) and leading to blindness.

Clinical signs

– Clinical signs of all conjuctivites include: redness of the eye and irritation. Visual acuity is not affected.

– Depending on the cause:
  • abundant and purulent secretions, eyelids stuck together on waking, unilateral infection at onset: bacterial conjunctivitis
  • watery (serous) secretions, no itching: viral conjunctivitis
  • excessive lacrimation, eyelid oedema, intense itching: allergic conjunctivitis

– In endemic areas, turn both upper eyelids up to check for signs of trachoma (see *Trachoma*, page 122).

– Suspect keratitis if patient reports intense pain (more than is usually associated with conjunctivitis) and photophobia. Instill one drop of **0.5% fluorescein** to check for possible ulcerations.

– Always check for foreign bodies (subconjunctival or corneal) and remove after administering **1% tetracaine** anaesthetic eye drops (two drops maximum). Never give bottle of eye drops to the patient.

Treatment

– *Bacterial conjunctivitis*
  • Clean eyes 4 to 6 times/day with boiled water or 0.9% sodium chloride.
  • Apply **1% tetracycline eye ointment** 2 times/day into both eyes for 7 days.
  • Never use corticosteroid drops or ointment.

– *Viral conjunctivitis*
  • Clean eyes 4 to 6 times/day with boiled water or 0.9% sodium chloride.
  • Apply local antibiotics if there is a (risk of) secondary bacterial infection (see above).

– *Allergic conjunctivitis*
  • Local treatment as for viral conjunctivitis.
  • Antihistamines for one to 3 days:
    promethazine PO
    Children from 2 to 5 years: 5 to 15 mg once daily or in 2 divided doses
    Children from 5 to 10 years: 10 to 25 mg once daily or in 2 divided doses
    Children over 10 years and adults: 25 to 50 mg once daily or in 2 divided doses
    or **chlorphenamine** PO
    Children from 2 to 5 years: 1 mg to be repeated 4 to 6 times/day without exceeding 6 mg/day
    Children from 6 to 12 years: 2 mg to be repeated 4 to 6 times/day without exceeding 12 mg/day
    Adults: 4 mg to be repeated 4 to 6 times/day without exceeding 24 mg/day

Note: in the event of a foreign body, check tetanus immunisation status.

Neonatal conjunctivitis

Conjunctivitis due to *Neisseria gonorrhoeae* and/or *Chlamydia trachomatis* in children born to infected mothers.

Clinical signs

– Purulent conjunctivitis within the first 28 days of life.
– *Gonococcal conjunctivitis* usually occurs 2 to 7 days after birth. The infection is bilateral in 50% of cases, highly contagious and may rapidly lead to severe corneal lesions and blindness.
– *Chlamydial conjunctivitis* usually occurs 5 to 14 days after birth. The infection is often unilateral.

Prevention

Immediately at birth:
– Clean eyelids with sterile 0.9% sodium chloride.
– Apply **1% tetracycline eye ointment** once into both eyes.
  Failing the above, use **1% silver nitrate**: one drop into both eyes (silver nitrate is toxic and difficult to prepare and keep in solution. It is therefore not suitable for isolated settings).

Note:
In case of maternal *herpes simplex virus* infection at delivery:
– Clean eyelids with sterile 0.9% sodium chloride.
– Apply **3% aciclovir eye ointment** once into both eyes, then wait 12 hours to apply 1% tetracycline eye ointment.

Treatment

At dispensary level

Treatment is urgent and the child should be referred. When immediate hospitalisation is not possible, clean and apply **1% tetracycline eye ointment** into both eyes every hour, until systemic treatment is available.

At hospital level

– If possible isolate the newborn for 24 to 48 hours.
– Treatment of choice is **ceftriaxone** IM: 50 mg/kg as a single dose (without exceeding 125 mg) if only the eyes are infected.
Failing the above, use **spectinomycin** IM: 25 mg/kg as a single dose (without exceeding 75 mg).
– Clean eyes with an isotonic sterile solution (0.9% sodium chloride or Ringer Lactate) to prevent secretions from adhering, and apply **1% tetracycline eye ointment** 4 times/day.
– If systemic treatment is not immediately available, apply **1% tetracycline eye ointment** into both eyes every hour until the treatment is available.
– Treat mother and partner (see *Sexually transmitted infections*, page 219)
– If treatment with ceftriaxone fails, treat for chlamydia:
erythromycin PO: 50 mg/kg/day in 2 or 3 divided doses for 14 days

Viral epidemic keratoconjunctivitis

(corneal and conjunctival lesions)

– Treat as viral conjunctivitis. If possible, refer to an ophthalmologist.
– Protect the eye with a compress as long as photophobia lasts. Remove as soon as possible.
– If necessary, administer a preventive dose of **vitamin A** (see page 118).

Systematic prophylaxis against ophthalmic complications of eruptive illnesses

(e.g. measles)

– Clean eyes with an isotonic sterile solution (0.9% sodium chloride or Ringer Lactate).
– Apply **1% tetracycline eye ointment** as for bacterial conjunctivitis.
– Systematically administer a curative dose of **vitamin A** (see page 117).

Trachoma

Trachoma is a keratoconjunctivitis due to *Chlamydia trachomatis*. Endemic and contagious, it is usually first contracted early in childhood by direct or indirect contact (dirty hands, contaminated towels, flies). In the absence of hygiene and effective treatment, the inflammation intensifies with successive infections, causing scars and deformities on the upper tarsal conjunctiva. The resulting ingrowing eyelashes (trichiasis) cause corneal lesions followed by permanent blindness, usually in adulthood.

Clinical signs and treatment

The WHO classifies trachoma into 5 stages. Early diagnosis and treatment is necessary to avoid the development of trichiasis and associated complications. Several stages can occur simultaneously.

– **Stage I**: trachomatous inflammation - follicular (TF)
  • Presence of five or more follicles in the upper tarsal conjunctiva. Follicles are whitish, grey or yellow elevations, paler than the surrounding conjunctiva.

– **Stage II**: trachomatous inflammation - intense (TI)
  • The upper tarsal conjunctiva is red, rough and thickened. The blood vessels, normally visible, are masked by a diffuse inflammatory infiltration or follicles.

  • Treatment of stages I and II:
    – Clean eyes and face several times per day.
    – Treatment of choice is **azithromycin** PO
      Child over 1 year: 20 mg/kg as a single dose
      Adult: 1 g as a single dose
    – Failing the above, apply **1% tetracycline eye ointment** 2 times/day for 6 weeks
    – Treat the whole family simultaneously.

– **Stage III**: trachomatous scarring (TS)
  • In the absence of treatment, follicles disappear, leaving scars. Scars are white lines, bands or patches in the tarsal conjunctiva.
  • No treatment.

– **Stage IV**: trachomatous trichiasis (TT)
  • Due to multiple scars, the margin of the eyelid turns inwards (entropion), the eyelashes rub the cornea and cause ulcerations and chronic inflammation.

  • Treatment: surgical correction of entropion
    While waiting for surgery, palliative measures can help protect the cornea if regular patient follow-up is possible:
    Fixing of eyelashes: this method consists of sticking the ingrowing eyelashes to the external eyelid with a fine double-sided sticking-plaster, making sure that the eyelid can open and close perfectly. In certain cases this allows for a permanent correction of the trichiasis within a few months.

Epilation of eyelashes: removal of the ingrowing eyelashes offers temporary relief but needs to be repeated every 4 to 6 weeks (regrowing eyelashes are sharper and more abrasive to the cornea).

– **Stage V**: Corneal opacity (CO)
  • Cornea gradually loses its transparency, leading to visual impairment and blindness.
  • No treatment.

Prevention

Trachoma is associated with poverty, overcrowding, lack of water, poor hygiene.

– Cleaning of the eyes, face and hands with safe water reduces direct transmission and the development of secondary bacterial infections.
– Improve access to clean water in sufficient amounts; eliminate human and animal waste to reduce density of flies and the indirect transmission of the disease.

Other pathologies

Onchocerciasis (river blindness)

The most severe manifestations of onchocerciasis are ocular lesions, which are associated to the density of the parasite load. As the infected person ages, the parasite load increases, as well as the risk of ocular damage.

Clinical signs

– Extra-ocular lesions : see *Filariases*, page 151.
– Ocular lesions:
  • At onset of ocular invasion or during inflammatory episodes of iridocyclitis: itching, lacrimation, photophobia.
  • Later, hemeralopia (night blindness). Decrease in visual acuity arises once lesions are irreversible.

Treatment

Ocular lesions are linked with parasite load. Therefore, antifilarial treatment should stop, or at least slow down ocular damage (see *Filariases*, page 151).

Pterygium

– A whitish, triangular growth of fibrovascular tissue extending slowly from the conjunctiva to the cornea. It occurs most frequently in patients who are exposed to wind, dust, or arid climates.
– Pterygium never disappears spontaneously.

Clinical signs and treatment

Two stages:
– Benign pterygium develops slowly, does not reach the pupil: no treatment.
– Progressive vascularized pterygium: red and inflamed growth covers the pupil and may blurr vision:
  • Clean eye with an isotonic sterile solution (0.9% sodium chloride or Ringer Lactate).
  • Surgical removal if facilities are available.

Cataract

Opacity of the lens that causes a progressive loss of visual acuity. Cataract is common in the tropics and can occur at a younger age than in Europe.

The presence of cataract in both eyes leads to blindness. Surgery is the only treatment.

CHAPTER 6

Parasitic diseases

Malaria

Malaria is a parasitic disease due to a protozoan of the genus *Plasmodium* transmitted to man by the female *Anopheles* mosquito. Four species of *Plasmodium* are to be distinguished: *P. falciparum*, *P. vivax*, *P. malariae* and *P. ovale*. Only *P. falciparum* gives rise to severe malaria attacks.

Clinical signs

– **Incubation**
7 to 12 days for *P. falciparum*; over 15 days for the other 3 species.

– **Uncomplicated malaria**
Fever, chills, sweating, headache, muscular ache, anorexia, nausea. The attack occurs every 2 days for *P. falciparum*, *P. vivax* and *P. ovale*, and every 3 days for *P. malariae*. In children: gastrointestinal disturbances (abdominal pain, diarrhoea, vomiting) are frequent.
Always consider malaria in a febrile patient living in or returning from an area where the disease is endemic.

– **Severe falciparum malaria**
Attacks mainly occur in non-immune subjects (expatriates, children under 5 years), in people whose immunity has been modified (pregnant women) and people living in hypo-endemic or seasonal transmission areas.
  • High fever
  • Neurological signs:
    - impaired consciousness: prostration (inability to sit in a child old enough to do so, or inability to drink or suck in younger children), drowsiness, delirium, coma (persisting for more than one hour in a child having experienced a convulsion; persisting despite glucose administration in a hypoglycaemic child);
    - seizures (in young children, may be difficult to distinguish from febrile convulsions);
    - signs of localization.
  • Severe anaemia, particularly in children, rapidly fatal in the absence of transfusion.
  • Renal dysfunction (rare in children): oliguria, anuria, in the absence of signs of dehydration or persisting after adequate rehydration.
  • Hypoglycaemia (< 2.2 mmol/l or < 0.40 g/l): frequent in children and pregnant women, to be suspected in any patient with impaired consciousness. Check blood glucose level systematically, using a reagent-strip test.
  • Pulmonary oedema: particularly in adults, almost always fatal. It may be related to fluid overload but may also develop despite a normal or negative fluid balance. High parasitaemia, renal impairment and pregnancy are promoting factors.
  • Macroscopic haemoglobinuria: dark red urine.
  • Respiratory distress: slow, deep breathing due to metabolic acidosis.
  • Spontaneous haemorrhage (rare in children): check skin (petechiae), conjunctivae, nose, gums and gastrointestinal tract.
  • Jaundice: check mucosal surfaces of the mouth, conjunctivae and palms.
  • Circulatory collapse: cold extremities, weak pulse, slow skin recoloration time, cyanosis.

Laboratory

Any clinical suspicion of falciparum malaria must be confirmed, if possible, by a laboratory diagnosis:

– Thin and thick blood films enable the detection of the parasite, species determination, parasite counting and monitoring of the parasitaemia's evolution once treatment has been started.
Note: thin and thick blood films may be negative during a severe attack (pernicious) due to sequestration of the parasitized erythrocytes in peripheral capillaries.

– Rapid tests are used when a laboratory cannot be set up or when the laboratory is overburdened (population movements, malaria epidemic). Most of the tests only detect *P. falciparum*.
The rapid tests yield a qualitative result (positive or negative) and may remain positive for 3 to 14 days after the start of treatment, depending on the type of test. A rapid test should not be used instead of a thick film when the latter is feasible, since only thick film enables parasite counting and monitoring the evolution of the parasitaemia.

Resistance to antimalarials

– Before considering resistance, investigate other possible causes for treatment failure: poor compliance or errors in dosage (inadequate dosage, confusion between the doses expressed as base or as salt[1]), vomiting within an hour of intake, expired or counterfeit drugs.

– Confirm treatment failure by a positive falciparum smear.

– If resistance is confirmed, initiate second-line treatment. If relapses in the population seem frequent, it is recommended to carry out an in vivo resistance study to identify an effective first-line treatment.

Refer to the *P. falciparum* resistance map (WHO), page 134.

Resistance to chloroquine

– *P. falciparum* is resistant to chloroquine in Africa, Latin America, South-East Asia and Oceania. In Central America, Haiti and Dominican Republic, *P. falciparum* remains sensitive to chloroquine.

– *P. vivax* is, in general, still sensitive to chloroquine. Resistance has nonetheless been confirmed, particularly in Papua New Guinea, Salomon Islands, Myanmar and Indonesia.

– No chloroquine resistance has been reported for *P. malariae* and *P. ovale*.

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1 Equivalence between base and salts:

amodiaquine:
153 mg amodiaquine base = 200 mg amodiaquine hydrochloride
200 mg amodiaquine base = 260 mg amodiaquine hydrochloride

chloroquine:
100 mg chloroquine base = 130 mg chloroquine sulfate = 160 mg chloroquine phosphate or diphosphate
150 mg chloroquine base = 200 mg chloroquine sulfate = 250 mg chloroquine phosphate or diphosphate

quinine:
8 mg quinine base = 10 mg quinine dihydrochloride = 10 mg quinine hydrochloride = 10 mg quinine sulfate = 14 mg quinine bisulfate

P. falciparum resistance to sulfadoxine/pyrimethamine (SP)

Although still less frequent than chloroquine resistance, SP resistance usually follows the chloroquine resistance distribution within a few years.

P. falciparum resistance to mefloquine

Mainly present in South-East Asia. However, mefloquine sensitivity can be restored by combination with artesunate.

P. falciparum resistance to quinine

Clinical resistance to quinine has been observed (South-East Asia and Amazon region). Compared with quinine monotherapy, combination of quinine with doxycycline or clindamycin increases the cure rate.

Treatment of uncomplicated malaria (except in pregnant women)

1. Curative treatment

- ***P. falciparum* in chloroquine-resistance areas**

  The treatments of choice are artemisinin-based combination therapies (ACT): artesunate-SP or artesunate-amodiaquine or artesunate-mefloquine or coartemether.
  The choice of artemisinin-based combination depends on the known resistance level in the area concerned (review the resistance studies conducted in the country or assess by an in vivo resistance study).
  To improve compliance, use co-formulations (2 antimalarials combined in the same tablet) or co-blisters (the 2 antimalarials are not combined in the same tablet but are presented in the same blister).

  D1: **artesunate** 4 mg/kg + **SP**: 25 mg/kg **sulfadoxine** and 1.25 mg/kg **pyrimethamine** as a single dose
  D2, D3: **artesunate** 4 mg/kg once daily
  or
  D1, D2, D3: **artesunate** 4 mg/kg + **amodiaquine** 10 mg base/kg once daily
  or
  D1 : **artesunate** 4 mg/kg + **mefloquine** 15 mg/kg
  D2 : **artesunate** 4 mg/kg + **mefloquine** 10 mg/kg
  D3 : **artesunate** 4 mg/kg
  or
  D1, D2, D3: **coartemether** (20 mg artemether + 120 mg lumefantrine tablet)
  Children ≥ 10 kg: 2 tablets/day in 2 divided doses
  Children ≥ 15 kg and < 25 kg: 4 tablets/day in 2 divided doses
  Children ≥ 25 mg and < 35 kg: 6 tablets/day in 2 divided doses
  Adults: 8 tablets/day in 2 divided doses

  If ACT are not available:
  D1 to D7: **quinine** PO
  Children and adults ≤ 50 kg: 30 mg/kg/day in 3 divided doses at 8-hour intervals
  Adults > 50 kg: 1800 mg/day in 3 divided doses at 8-hour intervals
  In areas where resistance to quinine appears, combine quinine with:
  doxycycline PO (contra-indicated in children under 8 years): 100 mg once daily for 7 days or **clindamycin** PO: 20 mg/kg/day in 2 divided doses for 5 days

- ***P. falciparum* in chloroquine-sensitive areas**

  chloroquine PO as below

- ***P. vivax, P. malariae, P. ovale***

  chloroquine PO
  Children and adults:
  D1, D2: 10 mg base/kg once daily
  D3: 5 mg base/kg
  (this regimen provides a total dose of 25 mg base/kg in children and about 1.5 g base in adults.)

2. Symptomatic treatment

– Fever: remove excess clothing, wrap in a damp cloth and give **paracetamol** PO if needed (see *Fever*, page 26). Avoid acetylsalicylic acid (aspirin).

Treatment of severe malaria (except in pregnant women)

1. Curative treatment

The treatment of severe malaria is based on artemether IM or quinine. Artemether IM is the first-line treatment[2] but it may be poorly absorbed in patients in shock. In this event, use quinine IV.

- **Artemether protocol**

  Start with **artemether** IM (anterolateral aspect of the thigh):
  3.2 mg/kg by IM injection on the first day followed by 1.6 mg/kg once daily until the patient can swallow. Then, change to oral route with a complete curative treatment with one of the following artemisinin-based combination: **artesunate-SP** or **artesunate-amodiaquine** or **artesunate-mefloquine** or **coartemether** (see *treatment of uncomplicated malaria*, page 129).

  The choice of artemisinin-based combination depends on the known resistance level in the area concerned.

  Do not use the combination artesunate-mefloquine if the patient developed neurological signs during the acute phase.

- **Quinine protocol** (slow IV infusion[3], never direct IV injection)

  All injectable quinine salts have the same efficacy provided that the quinine base content is the same. All the dosages indicated above are expressed in **quinine dihydrochloride**.

  – Start with a *loading dose* of 20 mg/kg diluted in glucose solution (preferably 10% glucose)[4], to be administered by infusion over 4 hours.

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2 Artesunate IV is reported to be the most effective treatment, but it is rarely available. If available:
artesunate IV (or IM): 2.4 mg/kg as a single injection on D1, then 1.2 mg/kg once daily. As soon as the patient can swallow, change to oral route with an artemisinin-based combination, as for the artemether protocol.

3 Administration by IM deep injection (into the anterior thigh only) is possible when infusion cannot be performed. However this may cause complications (paralysis of sciatic nerve, muscular necrosis, infection). Doses are the same as for the IV route. Dilute quinine (1/2 or 1/5). For the loading dose, administer half the dose into each thigh. The SC route must not be used.

4 In the absence of 10% glucose, add 10 ml of 50% glucose to 100 ml of 5% glucose to obtain a 10% glucose solution.

– Then 5% glucose to keep the vein open over the next 4 hours.

⚠ Do not administer loading dose to patients who have received oral quinine, halofantrine or mefloquine within the previous 24 hours. Start with maintenance dose.

– Then *maintenance dose* of 10 mg/kg every 8 hours by infusion over 8 hours (or, better, alternate 4 hours of quinine diluted in 5% glucose and 4 hours of 5% glucose).

– Adapt the infusion volume to the patient's weight: for adults, administer each dose of quinine in 250 ml (when infused over 4 hours) or 500 ml (when infused over 8 hours). For children under 20 kg, administer each dose of quinine in a volume of 10 ml/kg (when infused over 4 hours) or 20 ml/kg (when infused over 8 hours).

– Monitor the patient closely (risk of pulmonary oedema and hypoglycaemia).

– As soon as the patient has received at least 3 doses of parenteral quinine and can swallow, change to the oral route with:

  • **quinine** PO to complete 7 days of treatment (+ doxycycline or clindamycin), see *treatment of uncomplicated malaria*, page 129.

  or

  • a complete curative treatment with one of the following artemisinin-based combination: **artesunate-SP** or **artesunate-amodiaquine** or **artesunate-mefloquine** or **coartemether** (see *treatment of uncomplicated malaria*, page 129).

  The choice of the artemisinin-based combination depends on the known resistance level in the area concerned.
  If the combination artesunate-mefloquine is used after quinine IV, wait 12 hours after the last dose of quinine before starting treatment with mefloquine.
  Do not use the combination artesunate-mefloquine if the patient developed neurological signs during the acute phase.

2. Symptomatic treatment

– Fever: remove excess clothing, wrap in a damp cloth and give **paracetamol** PO or by nasogastric tube (see *Fever*, page 26). Avoid acetylsalicylic acid (aspirin).

– Maintenance fluid requirements:
The total volume to be administered per 24 hours by oral or IV route is shown in the table below:

Patient body weight	Volume to be administered
5 to 10 kg	120 ml/kg/day
11 to 19 kg	80 ml/kg/day
20 to 30 kg	60 ml/kg/day
> 30 kg	50 ml/kg/day

Adjust the volumes according to the clinical condition in order to prevent dehydration or, on the contrary, fluid overload (marked risk of pulmonary oedema).
Note that the volume used to administer the quinine IV is included in the total volume to be administered per 24 h.

– Nursing in the event of cerebral malaria: position the patient in lateral decubitus and alternate sides frequently. Eye care: clean with 0.9% sodium chloride, apply **1% tetracycline eye ointment**, close and protect with a compress. Clean the mouth and nostrils several times per day.

– Seizures: **diazepam**, intrarectal (see *Seizures*, page 23).

– Severe anaemia: in the event of haemoglobin < 5 g/dl or haematocrit < 15%, or poorly tolerated anaemia, transfuse (blood screened for HIV, hepatitis B and C etc.).

– Renal failure: insert a urinary catheter and measure urine output. Anuria is defined as an urine output < 12 ml/kg/day in children and < 400 ml/day in adults. In the event of dehydration and no sign of pulmonary oedema, restore urine output with 0.9% sodium chloride or, failing that, Ringer Lactate (up to 20 ml/kg infused over 1 hour).
If urine output does not resume, **furosemide** IV:
Children: 2 mg/kg/injection, double the dose every hour up to a maximum of 8 mg/kg by slow IV infusion over 15 minutes, depending on response.
Adults: initially 40 mg IV, then increase the dose every hour, depending on response, to 100, 200 and 400 mg (for doses > 200 mg, dilute in 100 ml of 5% glucose and administer over 20 to 30 minutes).
Check treatment efficacy by measuring urine output every 2 to 4 hours.

– Hypoglycaemia: **hypertonic 50% glucose**, 1 ml/kg by slow IV injection, then infusion of 10% glucose to prevent recurrence. In patients in a coma, check blood glucose level using a reagent-strip test every 2 to 4 hours.

– Pulmonary oedema: install the patient in a semi-sitting position. Give oxygen and decrease the infusion rate.
furosemide IV:
Children: 1 mg/kg/injection to be repeated after 1 to 2 hours if needed
Adults: 40 mg/injection to be repeated after 1 to 2 hours if needed

– Septicaemia: see *antibiotic therapy for septic shock*, page 20.

– Shock: treat the cause, see *Shock*, page 17.

– Spontaneous haemorrhage: blood transfusion. Acetylsalicylic acid (aspirin) and IM injections are contra-indicated.

Treatment of malaria in pregnant women

	1st trimester	2nd and 3rd trimesters
Uncomplicated falciparum malaria	**quinine** PO: 30 mg/kg/day in 3 divided doses at 8-hour intervals for 7 days	See protocol for uncomplicated malaria, pages 129 and 130 and respect the contra-indications, see following page.
Severe falciparum malaria	**quinine** IV: see protocol for severe malaria, pages 130 and 131 and respect the contra-indications, see following page.	**quinine** IV or **artemether** IM: see protocol for severe malaria, pages 130 and 131 and respect the contra-indications, see following page.
P. vivax*, *P. malariae*, *P. ovale	**chloroquine** PO: D1, D2: 10 mg base/kg D3: 5 mg base/kg	

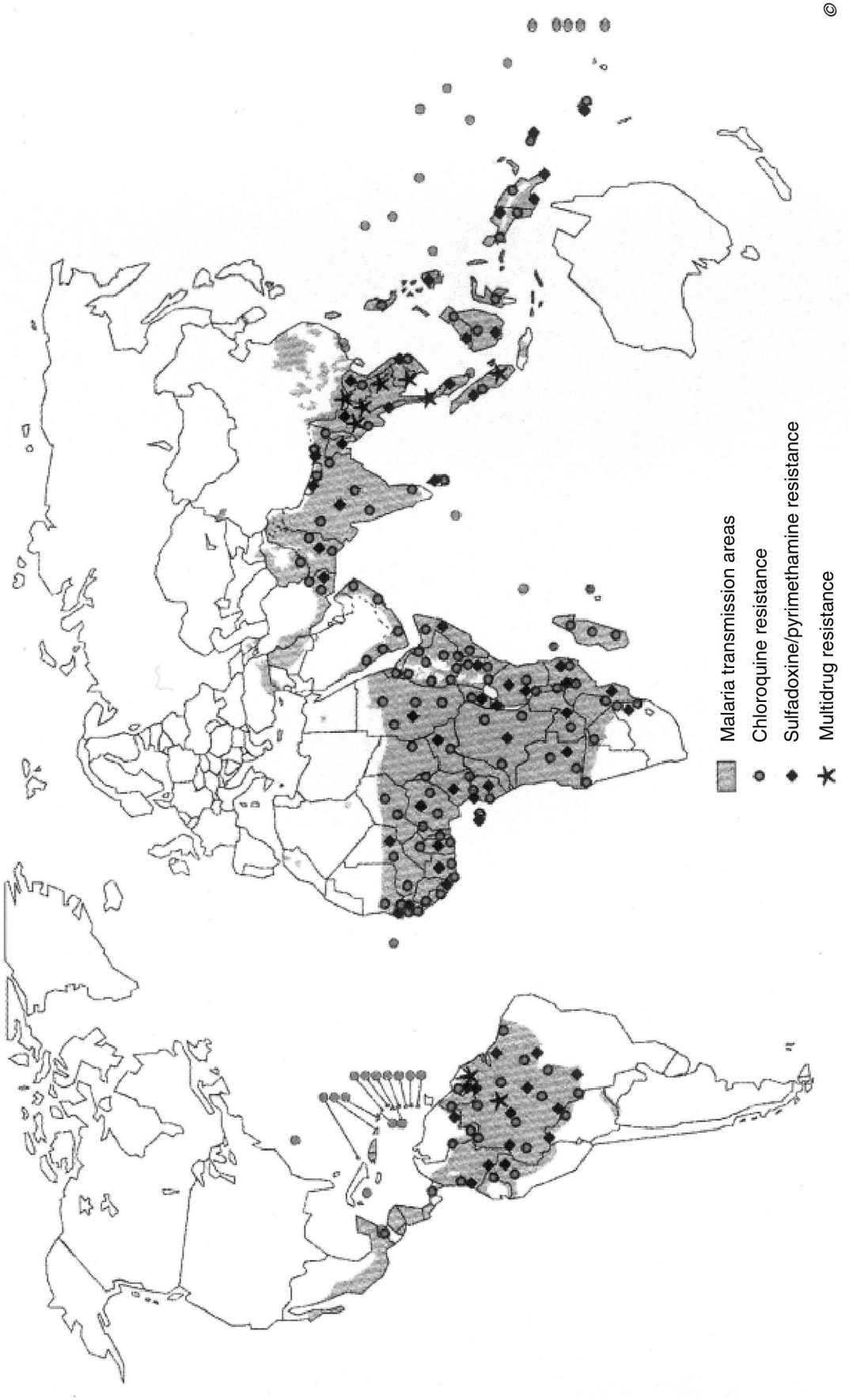
– Do not administer mefloquine during the first trimester of pregnancy.
– Do not administer doxycycline or coartemether at any time during pregnancy.
– Quinine is the first-line treatment for severe *falciparum* malaria during the first trimester due to its efficacy and safety.
– Artemisinin derivatives can be administered during the second and third trimesters. Their safety during the first trimester has not been formally established. However, in case of life threatening malaria or uncontrolled hypoglycaemia on quinine IV, the mother's survival takes precedence over a potential teratogenic risk.

Prevention

– Individual protection against *Anopheles* mosquitoes:
  • pyrethroid-impregnated mosquito net (permethrin or deltamethrin)
  • long sleeves and trousers in the evening
  • application of insect repellents
  • slow-burning mosquito coils

– Chemoprophylaxis:
  • Mass chemoprophylaxis is not recommended (emergence of resistance, delay or suppression of immunity) and collective prevention should only address the eradication of *Anopheles* mosquitoes.
  • Individual chemoprophylaxis is to be restricted to:
    1. Non-immune subjects visiting an endemic area. The choice of prophylaxis depends on the region, the duration of the stay, the season (transmission or not), and the presence or absence of resistant *P. falciparum*. Individual chemoprophylaxis does not induce 100% protection but prevents severe attacks.
    2. Pregnant women living in an endemic area:
       mefloquine: the risk/benefit ratio of prophylaxis is positive from the 4th month of pregnancy (250 mg/week).
       In areas of high transmission where **sulfadoxine/pyrimethamine** is effective, intermittent presumptive treatments with **SP** can be administered in the second and third trimester of pregnancy to reduce the consequences of malaria (anaemia, low birth weight, etc.). Check for national recommendations.

Malaria transmission areas and reported *P. falciparum* drug resistance



Human african trypanosomiasis (sleeping sickness)

– Sleeping sickness is a zoonosis due to flagellated protozoan parasites of the genus *Trypanosoma* transmitted to man by the bite of the tsetse fly (*Glossina*). Transmission by contaminated blood transfusion and transplacental transmission are also possible.
– The disease is found only in Africa. There are two forms, depending on the parasite involved: *Trypanosoma brucei gambiense* in West Africa and Central Africa and *Trypanosoma brucei rhodesiense* in East Africa and Southern Africa.

Clinical signs

– ***T.b. gambiense trypanosomiasis***
  • Inoculation: sometimes followed by an immediate local reaction (trypanosomal chancre).
  • Incubation: from a few days to several years, on average 3 weeks.
  • Haematogenous and lymphatic dissemination of the parasite or haemolymphatic stage:
  Fever (intermittent febrile episode lasting 1 to 5 days on average, regressing as the disease evolves), lymphadenopathies (mainly cervical painless, mobile, firm nodes), frequent hepatosplenomegaly and skin signs (facial oedema, trypanids, pruritus).
  • Central nervous system (CNS) invasion or meningoencephalitic stage:
  Attenuation or resolution of the signs of the haemolymphatic stage. Insidious development of neurological signs, varying depending on the case: sensory disturbances (deep hyperaesthesiae), mental disorders (behavioral changes: apathy or excitation), reversal of sleep patterns (with daytime somnolence alternating with insomnia at night), impaired motor functions (paralysis, seizures, tics) and endocrine disorders (amenorrhoea, impotence, thyroid dysfunction).
  • Untreated trypanosomiasis leads to cachexia, lethargy, coma and death.

– ***T.b. rhodesiense trypanosomiasis***

  The early stage is the same as above, but symptoms are more severe and acute. The infection usually progresses more rapidly. Patients often die of myocarditis in 3 to 6 months without having developed signs of the meningoencephalitic stage.

Note: the clinical forms of *gambiense* and *rhodesiense* trypanosomiasis can be difficult to differentiate: for example, there exist cases of acute *gambiense* infection and others of chronic *rhodesiense* infection, etc.

Laboratory

– The card agglutination trypanosomiasis test (CATT) is the most widely used screening tool for detection of *T.b. gambiense* infection.

– Diagnosis of the haemolymphatic stage:
  • detection of trypanosomes in lymph node aspirates or in blood (microhaematocrit centrifugation technique, Woo test), quantitative buffy coat (QBC), mini-anion-exchange column (MAEC), thick blood film;
  • and no change in the cerebrospinal fluid (CSF): no trypanosomes, no raised leucocyte count, no elevated protein levels.
– Diagnosis of the meningoencephalitic stage:
  • detection of trypanosomes (in CSF or more rarely in blood or lymph);
  • and change in the CSF: raised leucocyte count or elevated protein levels.

Treatment

– Due to the toxicity of trypanocides, positive identification of the parasite is essential before initiating treatment. Without parasitological diagnostic confirmation, treatment must remain exceptional (suspicion of trypanosomiasis based on clinical, serological and epidemiological arguments; patient in life-threatening condition, etc.).
– Several protocols and treatment regimens exist. Check national recommendations and resistance levels.
– Treatment must be administered under close medical supervision.

Haemolymphatic stage

– ***T.b. gambiense and T.b. rhodesiense trypanosomiasis***

suramine slow IV
Children and adults: D1 : 5 mg/kg
D3, D10, D17, D24, D31: 20 mg/kg without exceeding 1 g/injection

⚠ Suramin may cause numerous adverse effects related to its high toxicity and its filaricidal action on *Onchocerca volvulus* (anaphylactic reactions, collapse). Before the first injection, an IV test-dose should be administered to detect hypersensitivity: inject a few microliters and wait at least one minute. In the absence of reaction, inject 0.5 ml and wait at least one minute. In the absence of reaction, complete the slow IV injection. In the event of an anaphylactic reaction, patient should never receive suramin again.

– ***T.b. gambiense trypanosomiasis only***

pentamidine isetionate deep IM
Children and adults: 4 mg/kg once daily for 7 to 10 days without exceeding 300 mg/injection.

Meningoencephalitic stage

Before administrating trypanocides, the priority is to improve the patient's general condition (treatment of malnutrition, main infections, rehydration, etc.). It is nonetheless recommended not to postpone the trypanocidal treatment for more than 10 days.

– ***T.b. gambiense and T.b. rhodesiense trypanosomiasis***

melarsoprol IV: 3.6 mg/kg by slow strict IV injection once daily (without exceeding 180 mg, i.e. 5 ml/injection). Usually, 3 to 4 series of 3 to 4 injections given with a drug-free interval of 7 to 10 days between each series.

A new treatment regimen is being validated in many countries: 2.2 mg/kg by slow strict IV injection once daily for 10 consecutive days.

prednisolone or **prednisone** PO is frequently combined throughout the duration of treatment:
Children and adults: 1 mg/kg/day

– ***T.b. gambiense trypanosomiasis only***

Due to the very severe adverse effects (reactive encephalopathy, etc.) and the growing number of melarsoprol treatment failures, eflornithine is the first-line treatment for the meningoencephalitic stage of *T.b. gambiense* infection, despite the difficulty involved in its administration.

eflornithine IV infusion
Children and adults: 400 mg/kg/day in 4 divided infusions (every 6 hours) administered over at least 45 minutes, for 14 days

Special situations

– **Treatment of pregnant women**

All trypanocides are toxic for the mother and for the foetus (risk of miscarriage and malformation). However, due to the life-threatening risk for the mother and the risk of transplacental transmission, treatment must be initiated as follows:

Haemolymphatic stage: treat with **pentamidine** for *T.b. gambiense* and **suramin** for *T.b. rhodesiense*.

Meningoencephalitic stage: treatment depends on the mother's condition:
- If in immediately life-threatening condition: administration of melarsoprol or eflornithine cannot be deferred until after delivery.
- If not immediately life-threatening condition: treat with **pentamidine** for *T.b. gambiense* and **suramin** for *T.b. rhodesiense*. Treatment with melarsoprol or eflornithine is to be administered after delivery.

– **Treatment of relapses**

Parasite	Initial treatment	Treatment of relapse
T.b. gambiense	**pentamidine** or **suramin**	**eflornithine** for 7 days or, failing that, **melarsoprol**
	melarsoprol	**eflornithine** for 7 days
T.b. rhodesiense	**suramin**	**melarsoprol**
	melarsoprol	**melarsoprol**

– **Compassionate treatments**

Compassionate treatments are generally combinations based on melarsoprol, eflornithine or nifurtimox (nifurtimox is not registered for sleeping sickness and is usually used for Chagas' disease).

Prevention

– Individual protection against tsetse fly bites.
– Vector control (mainly effective for *T.b. rhodesiense*).
– Screening of patients.
– Reporting trypanosomiasis cases to the local health authorities.

American trypanosomiasis
(Chagas' disease)

– Chagas' disease is a zoonosis due to the flagellated protozoan parasite *Trypanosoma cruzi*, transmitted to man by triatomine bugs (reduviidae) through a break in the skin or mucous membranes. Transmission by contaminated blood transfusion and transplacental transmission are also possible.

– The disease is only found on the American continent in the area between the south of Mexico and the south of Argentina.

Clinical signs

– ***Acute phase***
  - Depending on the inoculation site, the first sign is a skin chancre or unilateral purplish orbital oedema (Romaña's sign) with local lymphadenopathy and fever (38°C, higher in children) over several weeks.
  - This is followed by multiple lymphadenopathies, hepatosplenomegaly, myocarditis (chest pain, heart failure), sometimes meningoencephalitis (seizures, paralysis).
  - Acute phase may be asymptomatic or subclinical.

  The transition from the acute to chronic phase does not always occur.

– ***Chronic phase***
  - Follows a long latent period after the acute phase: cardiac lesions (arrhythmia and conduction disorders, cardiomyopathy, heart failure, chest pain, thromboembolism) and gastrointestinal lesions (megaoesophagus and megacolon).
  - Most patients are asymptomatic.

Laboratory

– ***Acute phase***
  - Thin or thick film: detection of the parasite in blood or lymph nodes.
  - Serologic tests: detection of anti-*Trypanosoma cruzi* antibodies.
  - Xenodiagnosis: examination of the faeces of uninfected triatomine bug fed with the patient's blood.

– ***Chronic phase***
  - Serologic tests: detection of anti-*Trypanosoma cruzi* antibodies.

Treatment

– ***Acute phase***

nifurtimox PO (contra-indicated in the first trimester of pregnancy, breast-feeding or in patients with history of mental disorders or seizures):
Patient under 40 kg: 10 to 12 mg/kg/day in 2 to 3 divided doses for 30 to 60 days
Patient over 40 kg: 8 mg/kg/day in 2 to 3 divided doses for 30 to 60 days
The adverse effects of nifurtimox (anorexia, nausea, gastric pain, agitation, sleeping disorders, seizures) occur in less than 20% of cases and must not result in treatment discontinuation. Avoid alcohol during treatment.
or
benznidazole PO (contra-indicated in the first trimester of pregnancy and breast-feeding):
Patient under 40 kg: 7.5 mg/kg/day in 2 to 3 divided doses for 30 to 60 days
Patient over 40 kg: 5 mg/kg/day in 2 to 3 divided doses for 30 to 60 days
The minor adverse effects of benznidazole (nausea, skin rash) occur in about 50% of patients. In the event of purpura with fever, paraesthesia or peripheral polyneuritis, stop treament.

– ***Chronic phase in children under 12 years***

benznidazole PO
Children under 40 kg: 7.5 mg/kg/day in 2 to 3 divided doses for 30 to 60 days
Children over 40 kg: 5 mg/kg/day in 2 to 3 divided doses for 30 to 60 days

– ***Chronic phase in children over 12 years and adults***

Do not treat in the event of pregnancy, breast-feeding, hepatic or renal failure, or a severe intercurrent pathology.
nifurtimox PO: 8 to 10 mg/kg/day in 2 to 3 divided doses for 60 to 90 days
or
benznidazole PO: 5 mg/kg/day in 2 to 3 divided doses for 60 days

– ***Symptomatic treatment***

See seizures (page 23), pain (page 28) and heart failure (page 284).

Prevention

– Improvement of housing and vector control: plastered walls and cement floors, corrugated-iron roofs, insecticide spraying.
– Blood transfusions: screening donor blood for *T. cruzi* infection.

Leishmaniases

– Leishmaniases are parasitic diseases of man and numerous animals due to protozoa of the genus *Leishmania*, transmitted by the bite of sandflies.

– **Cutaneous** leishmaniasis occurs in Southern Europe, Asia (Middle-East, Afghanistan, Pakistan), Africa and Latin America.

– **Mucocutaneous** leishmaniasis occurs in Latin America and, more rarely, in Africa (Ethiopia, Sudan).

– **Visceral** leishmaniasis or kala-azar occurs in East and North Africa, Asia (India, Pakistan, Bangladesh, Nepal, China), Southern Europe and Latin America.

Clinical signs

Cutaneous and mucocutaneous leishmaniases

Single or multiple lesions on the uncovered parts of the body: a papule that extends in surface and depth to form a scabbed ulcer in the "dry" forms. The "wet" forms progress more rapidly and are more damaging.

Usually, lesions heal spontaneously, leaving a scar. Lesions may also spread to the mucosa (mouth, nose, conjunctiva) giving rise to the mucocutaneous form which may cause severe disfigurement.

Visceral leishmaniasis

Fever (of any type: persistent, undulating, in peaks) and splenomegaly are the 2 main signs. Weight loss and lymphadenopathies are frequent. Other signs: epistaxis, pallor, anaemia, hepatomegaly and diarrhoea.

Untreated visceral leishmaniasis leads to death.

Post-kala-azar dermal leishmaniasis

Cutaneous lesions of unknown aetiology, occuring after treatment of visceral leishmaniasis. The mucosa may be involved. In severe cases, systemic treatment as for visceral leishmaniasis is necessary (pentavalent antimonials, paromomycin).

Laboratory

– Parasitological diagnosis:
  • tissue biopsy from the edge of the ulcer for cutaneous forms
  or
  • splenic, bone marrow, lymph nodes aspiration-biopsy for the visceral form (splenic aspiration is the most sensitive technique but carries a theoretical risk of potentially fatal haemorrhage)
  then
  • demonstration of *Leishmania* in smear, Giemsa staining: parasites lying free or sometimes intracellular (inside macrophages).

– Serological diagnosis: ELISA and IFAT. Direct agglutination test (DAT) can be used in the field when a laboratory is not available.
– In visceral leishmaniasis: raised ESR and pancytopenia.

Treatment

The various species of *Leishmania* respond differently to drugs. Consider national recommendations. For information:

Cutaneous and mucocutaneous leishmaniases

– Forms with a single lesion or few lesions: start by local treatment with a pentavalent antimonial:
meglumine antimoniate or **sodium stibogluconate**: 1 to 3 ml infiltrated into the edge and base of the lesion and repeated if necessary. The IM route is restricted to severe cases and must be administered under close medical supervision.
– Mucocutaneous forms: systemic treatment as for visceral leishmaniasis, with **meglumine antimoniate** or **sodium stibogluconate** or **amphotericin B** (see below).

Visceral leishmaniasis

– Start treatment with a pentavalent antimonial:
meglumine antimoniate IM (81 mg Sb^{5+}/ml) or **sodium stibogluconate** IM (100 mg Sb^{5+}/ml)
The doses, expressed in terms of antimony, are the same for both drugs:
Children and adults: 20 mg/kg once daily for 30 days
– Symptomatic treatment of fever, anaemia (iron + folic acid, see *anaemia*, page 34) and the frequent intercurrent infections (malaria, dysentery, pneumonia, etc.) is crucial. HIV infection may also be present.
– Hydration and high-protein high-calorie diet.

Second-line treatment in the event of non-response to pentavalent antimonials

– **paromomycin** (**aminosidine**) IM
Children and adults: 15 mg/kg once daily for 21 days in combination with a pentavalent antimonial as above.
Paromomycin may also be used alone. The dosage and treatment duration vary depending on the regimen.

or

– **liposomal amphotericin B** (less toxic than amphotericin B) by strict IV infusion in 5% glucose over one hour:
Children and adults: the total dose administered over the full course of treatment is usually 24 mg/kg divided in 6 infusions, i.e. 4 mg/kg/infusion once daily for 6 days or on alternate days for 2 weeks.
Start with a 1-mg dose administered by slow IV route (over 10 to 15 minutes) to test for allergic reactions and patient tolerance.

or, failing that,

– **amphotericin B** IV infusion in 5% glucose over 4 hours:
  The drug is active but nephrotoxic. Do not exceed the indicated doses.
  Children and adults: start with a 1-mg dose by slow IV (over 20 to 30 minutes) to test for allergic reactions and patient tolerance. Gradually increase, by increments of 5 to 10 mg/day, to a dose of 0.5 to 1 mg/kg/day, maximum, administered on alternate days. The total dose administered over the full course of treatment is usually 20 mg/kg.

or

– **pentamidine** slow deep IM injection (with the patient supine):
  Can be used, but the drug is more toxic and less effective than pentavalent antimonials.
  Children and adults: 4 mg/kg/injection on alternate days for a total treatment duration of 5 to 25 weeks, until no parasites are detected on microscopy (for visceral leishmaniasis, 2 negative biopsy-aspirates at an interval of 14 days).

Prevention

– Insecticide-impregnated mosquito nets.

– Vector control and elimination of animal reservoir hosts.

Intestinal protozoan infections[1]

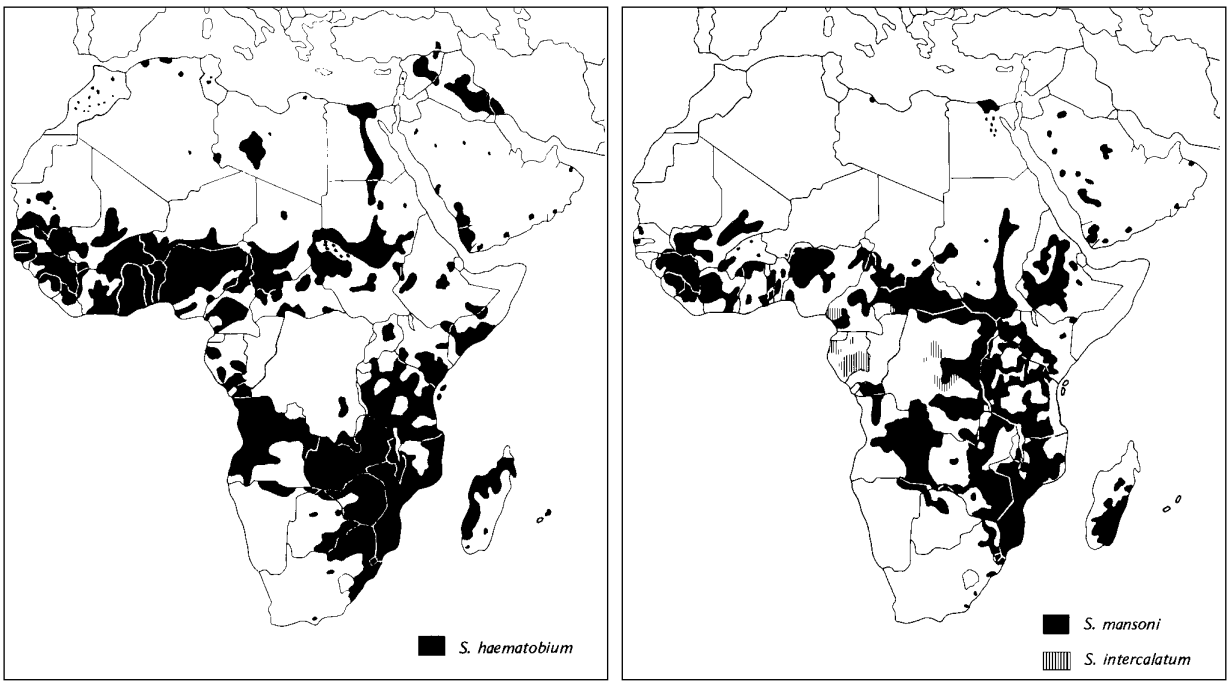
Parasites	Clinical signs / Laboratory	Treatment	Transmission / Prevention
Giardia lamblia (giardiasis)	Asymptomatic or intermittent signs: nausea, flatulence, epigastric pain, abdominal cramps, diarrhoea, malodorous and bulky stools. Malabsorption in severe forms Laboratory: motile trophozoites or cysts in stools	**tinidazole** PO Children: 50 mg/kg as a single dose without exceeding 2 g Adults: 2 g as a single dose or **metronidazole** PO Children: 15 mg/kg/day in 3 divided doses for 5 days Adults: 2 g once daily for 3 days	*Transmission* by direct or indirect faecal-oral route (dirty hands; ingestion of contaminated water and/or foods) *Prevention:* • individual: hand washing, nail cutting, drinking boiled or filtered water, washing or cooking foods • collective: hygiene and sanitation
Balantidium coli (balantidiasis)	Asymptomatic or intermittent diarrhoea or dysentery Laboratory: cysts or vegetative forms in stools	**metronidazole** PO Children: 35 to 50 mg/kg/day in 3 divided doses for 5 days Adults: 750 mg 3 times/day for 5 days	
Entamoeba histolytica	See *amoebiasis*, page 84		
Entamoeba coli *Entamoeba hartmani* *Endolimax nana*	Non pathogenic Laboratory: depending on species, cysts or vegetative forms in stools	No treatment	
Trichomonas intestinalis			
Isospora belli (isosporiasis)	Asymptomatic or watery diarrhoea sometimes accompanied by fever for a few days to a few weeks Laboratory: oocysts in stools on Ziehl's stain	**co-trimoxazole** PO Children: 50 mg SMX + 10 mg TMP/kg/day in 2 divided doses for 7 days Adults: 1600 mg SMX + 320 mg TMP/day in 2 divided doses for 7 days	
Cyclospora cayetanensis (cyclosporiasis)			
Cryptosporidium parvum (cryptosporidiosis)		No specific treatment in immunocompetent patients; recovery is spontaneous	

[1] Other than in HIV co-infection. See *HIV infection and AIDS* for treatment and prevention in HIV-infected patients, page 196.

Schistosomiases

– Schistosomiases are acute or chronic visceral parasitic diseases due to 5 species of trematodes which are transmitted to man by contact with the parasite when bathing or swimming.
– Each species gives rise to a specific clinical form: urinary schistosomiasis due to *Schistosoma haematobium*, intestinal schistosomiasis due to *Schistosoma mansoni*, *Schistosoma intercalatum*, *Schistosoma japonicum* and *Schistosoma mekongi*.
– The severity of the schistosomiasis depends on the parasite load. Heavily infected patients are prone to hepatic and bladder lesions with potentially irreversible sequelae.
– Children aged 5 to 15 years are particularly at risk: prevalence and parasite load are highest in this age group.

Geographic distribution of schistosomiasis in Africa *(WHO)*



Parasites	Clinical signs of established infection[1]	Laboratory	First-line treatment	Alternative
S. haematobium	**Genitourinary**: micro- or macroscopic haematuria, frequent and painful micturation. In the later stages: fibrosis and calcification of the bladder and ureters, bladder cancer.	Detection of eggs in urine Presumptive diagnosis in an endemic area: evidence of macroscopic haematuria by direct examination or microscopic haematuria by reagent-strip test.	**praziquantel** PO Children over 4 years and adults: 40 mg/kg as a single dose	No alternative
S. mansoni	Frequently asymptomatic or non-specific signs (asthenia, weight loss). **Intestinal and hepatosplenic**: in the event of heavy infection, abdominal pain, intermittent or chronic bloody diarrhoea, hepatosplenomegaly. In the later stages: hepatic fibrosis, portal hypertension, intestinal haemorrhage.	Detection of eggs in stools	**praziquantel** PO Children over 4 years and adults: 40 mg/kg as a single dose	**oxamniquine** PO[2] Duration and dosage vary depending on the region. Follow national protocol. For information: Children and adults: 15 to 60 mg/kg given over 1 or 2 days
S. japonicum *S. mekongi*	**Intestinal and hepatosplenic**: abdominal pain, chronic diarrhoea, hepatosplenomegaly. In the later stages: portal hypertension, intestinal haemorrhage, potential neurological complications (meningo-encephalitis, epilepsy).	Detection of eggs in stools	**praziquantel** PO Children over 4 years and adults: 60 mg/kg as a single dose or in 2 to 3 divided doses at intervals of 4 to 6 hours	No alternative
S. intercalatum	Often asymptomatic. **Intestinal**: in the event of heavy infection, rectal or colonic pain, bloody diarrhoea . In the later stages: less pathogenic, no hepatic fibrosis or portal hypertension in contrast with the other intestinal schistosomiases.	Detection of eggs in stools	**praziquantel** PO Children over 4 years and adults: 40 mg/kg as a single dose	No alternative

1 The phases of parasite penetration and maturation are frequently overlooked.
2 Oxamniquine is not recommended in pregnant or breast-feeding women.

Nematodes

Parasites	Clinical signs / Laboratory	Treatment	Transmission / Prevention
Ascariasis *Ascaris lumbricoides* (worldwide)	Phase of larval migration: pulmonary and allergic signs (nonproductive cough, mild fever) Established infection: asymptomatic or non-specific gastrointestinal signs (abdominal pain, vomiting), expulsion of adult worms Laboratory: eggs in stools, hypereosinophilia	**albendazole** PO[1] Children from 1 to 2 years: 200 mg as a single dose Children over 2 years and adults: 400 mg as a single dose or **mebendazole** PO[1] Children over 1 year and adults: 500 mg as a single dose	*Transmission* by faecal-oral route *Prevention:* • individual: hand washing, nail cutting • collective: hygiene and sanitation (water, latrines, etc.)
Strongyloidiasis *Strongyloïdes stercoralis* (humid tropical regions)	Often asymptomatic Phase of larval migration: cutaneous signs (erythema, pruritus) and pulmonary signs (cough, catarrh, asthma-like symptoms) Established infection: epigastric pain, vomiting, diarrhoea Laboratory: larvae in stools (Baermann), hypereosinophilia	**albendazole** PO[1] Children over 2 years and adults: 400 mg once daily for 3 days (examine the stools after 3 weeks and repeat the treatment if necessary) or **ivermectin** PO[2] Children over 5 years (or ver 15 kg) and adults: 200 µg/kg as a single dose, on an empty stomach	*Transmission* by percutaneous route (larvae penetrate the skin through the foot when a person walks on infected ground) or auto-infection *Prevention:* • individual: wear shoes • collective: hygiene and sanitation (water, latrines, etc.)
Ancylostomiasis *Ancylostoma duodenale* *Necator americanus* (tropical and subtropical regions)	Often asymptomatic Phase of larval migration: cutaneous and allergic signs Established infection: gastrointestinal signs (epigastric pain, sometimes diarrhoea); iron-deficiency anaemia in the event of chronic infection Laboratory: eggs in stools	**albendazole** PO[1] Children from 1 to 2 years: 200 mg as a single dose Children over 2 years and adults: 400 mg as a single dose or **mebendazole** PO[1] Children over 1 year and adults: 500 mg as a single dose or 200 mg/day in 2 divided doses for 3 days In the event of anaemia: iron salts (see *anaemia*, page 34)	*Transmission* by percutaneous route (larvae penetrate the skin through the foot when a person walks on infected ground) *Prevention:* • individual: wear shoes • collective: hygiene and sanitation (water, latrines, etc.)

Parasites	Clinical signs / Laboratory	Treatment	Transmission / Prevention
Enterobiasis *Enterobius vermicularis* (worldwide)	Often asymptomatic Perianal pruritus, more intense at night, vulvovaginitis (rare) Laboratory: eggs collected from perianal skin (scotch tape method)	**albendazole** PO[1] Children from 1 to 2 years: 200 mg as a single dose Children over 2 years and adults: 400 mg as a single dose or **mebendazole** PO[1] Children over 1 year and adults: 100 mg as a single dose Repeat if possible the same dose after 2 to 4 weeks. Treat the whole family even if no clinical signs.	*Transmission* by faecal-oral route or auto-infection *Prevention:* • individual: hand washing, nail cutting • collective: hygiene and sanitation (water, latrines, etc.)
Trichuriasis *Trichuris trichiura* (worldwide)	Often asymptomatic In the event of heavy infection: abdominal pain and diarrhoea Laboratory: eggs in stools	**albendazole** PO[1] Children from 1 to 2 years: 200 mg as a single dose Children over 2 years and adults: 400 mg as a single dose or **mebendazole** PO[1] Children over 1 year and adults: 500 mg as a single dose	*Transmission* by faecal-oral route *Prevention:* • individual: hand washing, nail cutting • collective: hygiene and sanitation (water, latrines, etc.)
Trichinosis *Trichinella spiralis* (Europe, Asia, Africa, North and South America)	Often asymptomatic Enteric phase: profuse diarrhoea, nausea, abdominal pain Invasive stage: fever, muscle pain, periorbital oedema, allergic signs Potential severe neurological complications if located in the brain. Laboratory: negative stools examination, hypereosinophilia	**albendazole** PO[1] Children over 2 years and adults: 800 mg/day in 2 divided doses for 8 to 14 days or **mebendazole** PO[1] Children over 2 years and adults: 600 mg/day in 3 divided doses for 3 days, then 1200 to 1500 mg/day in 3 divided doses for 10 days + **prednisolone** PO : 1 mg/kg/day over the duration of treatment in the event of severe infection	*Transmission* by eating raw, undercooked or smoked meat (pork, wild boar, horse) Individual *prevention*: cook meat sufficiently

[1] Albendazole and mebendazole are contra-indicated during the first trimester of pregnancy. Albendazole is to be avoided in breast-feeding women.

[2] Ivermectin is contra-indicated during pregnancy and the first week of breast-feeding.

Cestodes (adult forms)

Parasites	Clinical signs / Laboratory	Treatment	Transmission / Prevention
Taeniasis *Taenia saginata* *Taenia solium* (worldwide)	Often asymptomatic or segments expelled in the stools. Sometimes gastrointestinal disturbances (epigastric or abdominal pain, nausea, diarrhoea) Laboratory: eggs in stools or collected from perianal skin (scotch tape method), segments in stools	**praziquantel** PO[1] Children over 4 years and adults: 5 to 10 mg/kg as a single dose or **niclosamide** PO Children: 50 mg/kg as a single dose Adults: 2 g as a single dose Thoroughly chew the tablets before swallowing and wash down with as little water as possible.	*Transmission* by eating raw or undercooked meat: • beef for *T. saginata* • pork for *T. solium* *Prevention:* • individual: cook meat thoroughly • collective: slaughterhouse monitoring
Diphyllobothriasis *Diphyllobothrium latum* (temperate or cold lake areas)	Often asymptomatic In the event of heavy infection: mild gastrointestinal disturbances, anaemia due to vitamin B_{12} deficiency associated with (rare) neurological sequelae Laboratory: eggs in stools	**praziquantel** PO[1] Children over 4 years and adults: 10 to 25 mg/kg as a single dose or **niclosamide** PO Children: 50 mg/kg as a single dose Adults: 2 g as a single dose Thoroughly chew the tablets before swallowing and wash down with as little water as possible. If anaemia: **vitamin B 12 + folic acid**	*Transmission* by eating raw or undercooked freshwater fish Individual *prevention:* cook fish thoroughly
Hymenolepiasis *Hymenolepis nana* (worldwide)	Often asymptomatic In the event of heavy infection: gastrointestinal disturbances (epigastric pain) Laboratory: eggs in stools	**praziquantel** PO[1] Children over 4 years and adults: 15 to 25 mg/kg as a single dose or **niclosamide** PO Adults: 2 g as a single dose on D1, then 1 g/day for 6 days Thoroughly chew the tablets before swallowing and wash down with as little water as possible.	*Transmission* by faecal-oral route or auto-infection *Prevention:* • individual: hand washing, nail cutting • collective: hygiene and sanitation (water, latrines, etc.)

[1] Praziquantel must be administered to pregnant women with *T. solium* taeniasis and cysticercosis. For the other indications, treatment can usually be deferred until after delivery.

Cestodes (larvae)

Parasites	Clinical signs / Laboratory	Treatment	Transmission / Prevention
Cysticercosis *Taenia solium* (worldwide)	- Muscular: asymptomatic or myalgia - Subcutaneous: nodules - Neurological (neurocysticercosis) headache, convulsions, coma, etc. - Ocular: exophthalmia, strabismus, iritis, etc. Laboratory: hypereosinophilia in blood and cerebrospinal fluid	**albendazole** PO[2] Children over 2 years: 15 mg/kg/day in 2 divided doses (without exceeding 800 mg/day) for 8 to 30 days Adults: 800 mg/day in 2 divided doses for 8 to 30 days, repeat if necessary or **praziquantel** PO[3] Children over 4 years and adults: 50 mg/kg/day in 3 divided doses for 14 to 30 days In the event of *neurocysticercosis*: hospitalize, treat convulsions and combine with **prednisolone** PO for the entire duration of treatment, starting 2 or 3 days before.	*Transmission* by eating food contaminated with *T. solium* eggs or auto-infection Individual *prevention:* • treat *T. solium* carriers • hygiene • cook meat thoroughly
Hydatid cyst *Echinococcus granulosus* (South America, North, East and South Africa, Western Europe)	Cysts located in the liver (60% of cases); lungs (30% of cases), and, less frequently, in other sites including the brain. Long asymptomatic period. The cyst becomes symptomatic when complications develop (biliary obstruction; anaphylactic shock in the event of rupture into peritoneal cavity, vessels or an organ; febrile painful jaundice in the event of rupture into the biliary tree, etc.) .	First-line treatment: surgical excision **albendazole** PO[2] is useful in addition to, or instead of, surgery: Children over 2 years and adults under 60 kg: 15 mg/kg/day in 2 divided doses Adults over 60 kg: 800 mg/day in 2 divided doses Treatment duration: In addition to surgery (pre-operatively or post-operatively): continuous course of minimum 2 months or at least two 28-day courses with a drug-free interval of 14 days. Inoperable cases: 28-day courses with drug-free intervals of 14 days, for 3 to 6 months (on average), possibly up to 1 year.	*Transmission:* • direct: contact with dogs • indirect: water and food contaminated by dog faeces *Prevention:* • individual: avoid contact with dogs • collective: eliminate stray dogs, monitor slaughterhouses

2 Albendazole is contra-indicated during the first trimester of pregnancy.
3 Praziquantel is contra-indicated in the event of ocular cysticercosis.

Flukes

Parasites	Clinical signs / Laboratory	Treatment	Transmission / Prevention
Liver (biliary) flukes *Opisthorchis felineus* *Opisthorchis viverrini* *Clonorchis sinensis* (China, South-East Asia)	Urticaria, abdominal pain, diarrhoea, hepatobiliary symptoms (painful hepatomegaly, cholecystitis) Laboratory: eggs in stools, hypereosinophilia	**praziquantel** PO[1] Children over 4 years and adults: 75 mg/kg/day in 3 divided doses for 2 days	*Transmission* by eating raw or undercooked fish *Prevention:* cook fish thoroughly
Fasciola hepatica *Fasciola gigantica* (worldwide)	Phase of fluke's migration: urticaria, fever, right-upper-quadrant pain Established infection: hepatobiliary symptoms Laboratory: eggs in stools, hypereosinophilia	**triclabendazole** PO Children and adults: 10 mg/kg as a single dose or **bithionol** PO Children and adults: 30 mg/kg once daily for 5 days	*Transmission* by eating wild watercress, lamb's lettuce, dandelion *Prevention:* avoid eating raw wild plants
Lung flukes *Paragonimus* spp (South-East Asia, West Africa, Latin America)	Phase of fluke's migration: fever, urticaria, chest and abdominal pain Established infection: persistant cough, hemoptysis and possible mild fever Laboratory: eggs in sputum or stools	**praziquantel** PO[1] Children over 4 years and adults: 75 mg/kg/day in 3 divided doses for 2 days	*Transmission* by eating crayfish, freshwater crabs or shrimps *Prevention:* cook crustaceans thoroughly
Intestinal flukes *Heterophyes heterophyes* (Far East, India, Peru), *Metagonimus yokogawai* (Europe, North Africa) *Fasciolopsis buski* (China, Vietnam, India)	Asymptomatic or intermittent diarrhoea, then permanent diarrhoea and abdominal pain Laboratory: eggs in stools	**praziquantel** PO[1] Children over 4 years and adults: 25 mg/kg as a single dose	*Transmission* by eating raw or undercooked fish (*H. heterophyes, M. yokogawai*) or water chestnuts (*F. buski*) *Prevention:* cook fish thoroughly

[1] In pregnant women, treatment of distomatosis can usually be deferred until after delivery. Praziquantel is not effective against *Fasciola hepatica* and *gigantica*.

Filariases

Filariases are diseases due to several species of nematodes. The adult worms or macrofilariae live in subcutaneous tissue (*Loa loa* and *Onchocerca volvulus*) or lymphatic system (*Wuchereria bancrofti*, *Brugia malayi*, *Brugia timori*). Their larvae or microfilariae live in the skin (*O. volvulus*) or blood (other species).
Transmission occurs by vector insect bite. Co-infection by several species is frequent.

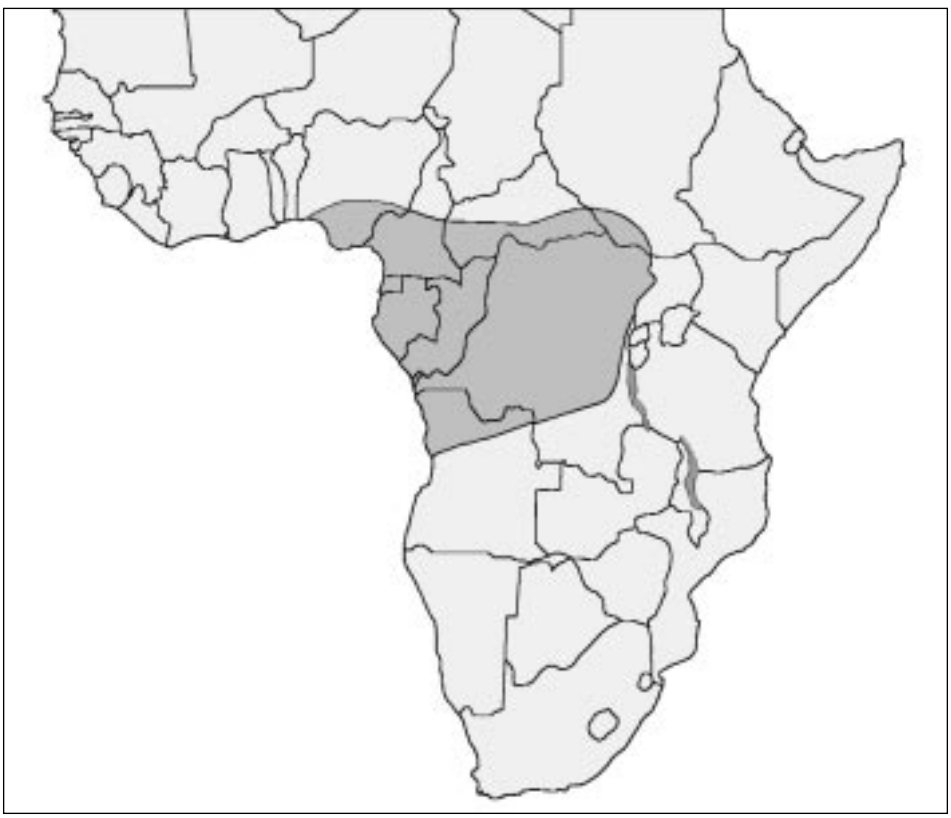
Clinical signs and laboratory

See table page 155.

Treatment

The efficacy and toxicity of filaricides vary depending on the species. Suramin, formerly used in the treatment of onchocerciasis, has been abandoned. Diethylcarbamazine is used less and less.
Ivermectin, administered alone or in combination with albendazole, is the least toxic treatment. During treatment, allergic reactions may occur but are generally minor (pruritus, skin rash, localized oedema, lymphangitis, fever).
In *Loa loa* carriers, much more severe reactions may occur (severe functional impairment, encephalopathy, coma). Therefore, prior to treating onchocerciasis or lymphatic filariasis in regions where loiasis is coendemic, it is essential to examine for and count Loa loa microfilariae in blood.

Geographic distribution of loiasis (Central African forests)



Loiasis

– Antifilarial treatment:
ivermectin PO[1] is the only possible treatment but may cause adverse effects. These reactions are more severe and frequent the higher the parasitic load. **Before treating, count the number of microfilariae** (in blood collected between 10 A.M. and 3 P.M.).

The microfilarial count is higher than 30 000 microfilariae/ml:
- If the loiasis is well tolerated, it is preferable to abstain from treatment.
- In the event of marked clinical signs or associated severe onchocerciasis: hospitalize, give **ivermectin** PO[1]: 150 µg/kg as a single dose and monitor the patient for 5 days.
  A severe reaction may occur toward D3 or D4. It is usually preceded by haemorrhages of the palpebral conjunctiva as of D2. Systematically check for this sign by turning back the eyelids.
  The prognosis of ivermectin-induced *Loa loa* encephalopathy is generally good if management is satisfactory (nursing, maintenance of fluid balance, etc.).
  Note: diethylcarbamazine-induced *Loa loa* encephalopathy is much more severe (death in 50% of cases, paralysis, dementia).

The microfilarial count is between 8000 and 30 000 microfilariae/ml:
Treatment with ivermectin may cause possibly severe, but reversible, functional impairment without neurological disorders. If treatment is necessary, monitor, as above, in a hospital or outpatient (family) setting, depending on the density of the parasitic load.

The microfilarial count is less than 8000 microfilariae/ml:
There is no risk of a severe reaction to ivermectin treatment. Treat as an outpatient.

– Symptomatic treatment of the allergic reactions related to treatment:
promethazine PO
Children from 5 to 10 years: 10 to 25 mg once daily or in 2 divided doses
Children over 10 years and adults: 25 to 50 mg once daily or in 2 divided doses
or **chlorphenamine** PO
Children of 5 years: 1 mg to be repeated 4 to 6 times/day without exceeding 6 mg/day
Children from 6 to 12 years: 2 mg to be repeated 4 to 6 times/day without exceeding 12 mg/day
Adults: 4 mg to be repeat 4 to 6 times/day without exceeding 24 mg/day

Lymphatic filariasis

– Antifilarial treatment:

- Lymphatic filariasis, whether associated with onchocerciasis or not, AND absence of *Loa loa* co-infection:
  ivermectin PO[1] 150 µg/kg + **albendazole** PO[2] 400 mg as a single dose
- Lymphatic filariasis, whether associated with onchocerciasis or not, AND presence of *Loa loa* co-infection:
  Determine *Loa loa* microfilariae count (see *Loiasis*) and, if treatment is indicated:
  ivermectin PO[1] 150 µg/kg + **albendazole** PO[2] 400 mg as a single dose.

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1 Ivermectin is not recommended in pregnant women or during the first week of breast-feeding. It is also not recommended in children under 5 years or under 15 kg.

2 Albendazole is contra-indicated during the first trimester of pregnancy.

Diethylcarbamazine may cause severe or even fatal adverse effects in those suffering from loiasis and onchocerciasis. The combination **diethylcarbamazine** PO[3] 6 mg/kg + **albendazole** PO[4] 400 mg as a single dose, can only be used in regions where *O. volvulus* and *L. loa* are absent (e.g. South-East Asia).

– Treatment of acute inflammatory attack: bed rest, anti-inflammatories, analgesics, local application of zinc oxide ointment, treatment of bacterial and fungal superinfections.

– Prevention of lymphoedema and acute inflammatory attacks: carefully wash (soap and water) and dry lesions. Cut toe nails and prevent them becoming ingrown. Raise the affected limb and possibly strap the limb during the day and remove the strapping at night. Treat bacterial and fungal superinfections.

– Surgical treatment of the chronic forms.

Onchocerciasis

– Antifilarial treatment:
  - Onchocerciasis AND absence of *Loa loa* or lymphatic filariasis co-infection:
    ivermectin PO[5]: 150 µg/kg as a single dose
  - Onchocerciasis AND presence of *Loa loa* co-infection:
    Determine *Loa loa* microfilariae count (see *Loiasis*) and, if treatment is indicated:
    ivermectin PO[5]: 150 µg/kg as a single dose
  - Onchocerciasis AND presence of lymphatic filariasis: see *Lymphatic filariasis*.

– Symptomatic treatment of the allergic reactions related to treatment: see *Loiasis*.

– Surgical treatment: excision, under local anaesthesia, of subcutaneous nodules, particularly cranial nodules. Avoid excising nodules over a blood vessel or nerve.

Mass treatment

National programs to eliminate lymphatic filariasis or onchocerciasis do not include routine laboratory testing. Check national recommendations. For information:

Loiasis

There is no mass treatment for loiasis as it is a relatively benign infection and treatment can cause severe reactions.

[3] Diethylcarbamazine must never be prescribed during an acute attack and is to be avoided in pregnant or breast-feeding women. Diethylcarbamazine may cause fatal encephalopathy in loiasis carriers.
[4] Albendazole is contra-indicated during the first trimester of pregnancy.
[5] Ivermectin is not recommended in pregnant women or during the first week of breast-feeding. Ivermectin is also not recommended in children under 5 years or under 15 kg.

Lymphatic filariasis

– In regions where only lymphatic filariasis is endemic:
diethylcarbamazine PO[6] 6 mg/kg + **albendazole** PO[7] 400 mg as a single dose, once per year

– In regions where lymphatic filariasis coexists with loiasis, mass treatment is not recommended due to the risk of severe treatment-related reactions.

– In regions where lymphatic filariasis coexists with onchocerciasis:
ivermectin PO[8] 150 µg/kg + **albendazole** PO[7] 400 mg as a single dose, once per year

Onchocerciasis

– In regions where only onchocerciasis is endemic:
ivermectin PO[8] 150 µg/kg as a single dose, once per year

– In regions where onchocerciasis coexists with loiasis, mass treatment is restricted to zones where onchocherciasis is meso- or hyperendemic.
Daily monitoring of the treated population is to be conducted for 1 week in order to detect and manage any severe reactions (check for haemorrhage of the palpebral conjunctiva as of D2, as in the individual treatment, see *Loiasis*).

– In regions where onchocerciasis coexists with lymphatic filariasis: see *Lymphatic filariasis*.

6 Diethylcarbamazine must never be prescribed during an acute attack and is to be avoided in pregnant or breast-feeding women. Diethylcarbamazine may cause fatal encephalopathy in loiasis carriers.
7 Albendazole is contra-indicated during the first trimester of pregnancy.
8 Ivermectin is not recommended in pregnant women or during the first week of breast-feeding. Ivermectin is also not recommended in children under 5 years or under 15 kg.

Parasites/Distribution	Clinical signs / Laboratory
Loiasis *Loa loa* Central African forests (cf. map)	Infection usually diagnosed when an adult worm migrates beneath the conjunctiva: pruritus, transient localised oedema, particularly of the wrists and forearms (Calabar swelling). Diagnosis: detection of microfilariae in blood collected between 10 A.M. and 3 P.M. Note: in 50 to 60% of infected patients, microfilariae are not found in the blood.
Lymphatic filariases – *Wuchereria bancrofti* Subsaharan Africa, Madagascar, Egypt, India, South-East Asia, Pacific, South America, Caribbean – *Brugia malayi* South-East Asia, China, India – *Brugia timori* Timor	Acute manifestations: recurrent attacks of fever lasting 7 to 10 days with localised lymphangitis of the limbs and scrotum. The patient is asymptomatic between episodes. Genital lesions possible with *W. bancrofti* (Bancroftian filariasis). Chronic manifestations: hydrocoele, epididymo-orchitis, elephantiasis, particularly of the legs, chyluria (milky or rice-water urine). Diagnosis: detection of microfilariae in blood collected between 10 P.M. and midnight. For *W. bancrofti* only, a rapid test detects circulating parasite antigens using finger-prick blood droplets taken any time of the day. In endemic loiasis zones, also investigate for *Loa loa* microfilariae in the blood before treating.
Onchocerciasis *Onchocerca volvulus* Intertropical Africa (99% of cases worldwide) Latin America (Guatemala, Mexico, Equator, Colombia, Venezuela, Brazil) Yemen	Cutaneous manifestations: firm subcutaneous nodule(s), generally painless, containing the adult worm, frequently intense pruritus, acute onchodermatitis (filarial itch) frequently superinfected, chronic onchodermatitis: skin atrophy, hyperpigmentation, depigmentation of the pretibial regions (“leopard skin”). Functional ocular syndrome (pruritus, microfilariae in the anterior chamber, hemeralopia, reduction in visual acuity which may terminate in blindness) and ocular lesions (sclerosing keratitis, iridocyclitis, choroidoretinitis, optical atrophy). Diagnosis: detection of microfilariae in bloodless skin snip or of macrofilariae after excision of nodules. In endemic zones, also investigate for *Loa loa* microfilariae in blood before treating.

CHAPTER 7

Bacterial diseases

Bacterial meningitis

– Acute meningeal inflammation of bacterial origin, which may affect the brain and carry a risk of neurological sequelae.

– The main bacteria responsible are:

In a non-epidemic context:
- in patients over 3 years: meningococcus and pneumococcus
- in children between 2 months and 3 years: *Haemophilus influenzae*, pneumococcus and meningococcus
- in infants under 2 months: *Escherichia coli*, *Listeria monocytogenes*, *Salmonella* spp, group B streptococcus

In an epidemic context; particularly in Sub-Saharan Africa, but not exclusively (Rwanda, Angola, Brazil), during the dry season:
- in patients over one year: meningococcus A or C or W135
- in infants under one year: the other pathogens are also found

– In a high-risk zone, during the dry season, monitor the weekly incidence of meningitis. The critical threshold used to define an outbreak is 15 cases/100 000 persons/week. Inform the local authorities in order to decide what public health measures should be taken.

Clinical signs

– **Children over one year and adults**
- classic febrile meningeal syndrome with severe headache, neck stiffness, Brudzinski's sign (neck flexion in a supine patient results in involuntary flexion of the hips and knees) and Kernig's sign (attempts to extend the knee from the flexed-thigh position are met with strong passive resistance).
- severe forms: coma, convulsions, focal signs, purpura fulminans.

– **Children under one year**

The classic signs of meningitis are often absent. Consider meningitis if the following signs are present:
- refusal to eat, fever, diarrhoea, vomiting, drowsiness, high-pitched cry, unusual behaviour
- generalised or partial seizures, gaze turned upwards, coma
- hypotonia, limp neck, bulging fontanelle when not crying

Other clinical forms: minimal purpura; no fever.

Laboratory

– To confirm a clinical suspicion, carry out a lumbar puncture and examine the cerebrospinal fluid (CSF).

Always ask for a Gram stain and direct microscopic examination if this is possible.

	Normal CSF	Bacterial meningitis
Appearance	clear	turbid, "rice water"
White cell count	< 5/mm^3	polynuclear cells > 500/mm^3
Protein	< 0.40 g/l (negative Pandy's test)	about 1 g/l (positive Pandy's test)

– Rapid test for detection of bacterial antigens.

In an epidemic context, once the meningococcal aetiology has been confirmed, there is no need for routine lumbar puncture for new cases.

In an endemic area, it is essential to test for cerebral malaria (thin and thick films).

Treatment

Prompt treatment is decisive in the prognosis.

At dispensary level

– Start antibiotics without delay if the lumbar puncture yields a turbid CSF and refer to hospital.
– In an epidemic context, treatment based on long-acting oily chloramphenicol or ceftriaxone is usually administered at the dispensary.

At hospital level

1. Meningitis in an epidemic context[1]

– **Children over one year and adults** (except for pregnant or breast-feeding women)
oily chloramphenicol IM: 100 mg/kg as a single dose without exceeding 3 g (divide the dose into two injections if needed, half-dose in each buttock) as shown below.

Age	1 year	2 years	6 years	10 years	15 years and adults
Dose	do not administer	1 g	1.5 g	2 g	2.5 g	3 g

If there is no clinical improvement after 24 hours, administer the same dose of oily chloramphenicol again.
If there is no clinical improvement 24 hours after the second injection of oily chloramphenicol, change to **ceftriaxone** IM or, failing that, **ampicillin** IV (see below).

1 Refer to the MSF handbook *Management of epidemic meningococcal meningitis*.

Alternatives to oily chloramphenicol:
ceftriaxone IM
Children: 100 mg/kg as a single dose
Adults: 2 g as a single dose (1 g into each buttock)
If there is no clinical improvement after 24 hours, administer the same dose of ceftriaxone again.
or
ampicillin IV
Children: 200 mg/kg/day in 3 or 4 divided doses administered at regular intervals
Adults: 12 g/day in 3 or 4 divided doses administered at regular intervals

Change to oral treatment as soon as possible, to complete 7 days of treatment with **amoxicillin** PO:
Children: 100 mg/kg/day in 2 or 3 divided doses
Adults: 6 g/day in 2 or 3 divided doses

– **Children from 2 months to one year**

Prefer **ceftriaxone** IM: 75 to 100 mg/kg once daily for 5 days
or, failing that:
ampicillin IV: 200 mg/kg/day in 3 or 4 divided doses administered at regular intervals. Change to oral treatment as soon as possible to complete at least 7 days of treatment with **amoxicillin** PO: 100 mg/kg/day in 2 or 3 divided doses

– **Children under 2 months**

Ampicillin is the best antibiotic, as ceftriaxone is not effective against *Listeria* which is often encountered in children of this age.

ampicillin IV: 200 mg/kg/day in 3 or 4 divided doses administered at regular intervals for at least 2 days, then change to oral treatment to complete at least 7 days of treatment with **amoxicillin** PO: 100 mg/kg/day in 2 or 3 divided doses

– **Pregnant or breast-feeding women**

Use **ceftriaxone** IM or **ampicillin** IV at the doses indicated on the previous page.

2. *Meningitis in a non-epidemic context*

– The treatment of choice is:
ceftriaxone IM
Children: 75 to 100 mg/kg once daily for 5 to 7 days
Adults: 1 to 2 g once daily for 5 to 7 days (1 g into each buttock)
Due to the relatively high incidence of pneumococcus in children under 3 years, ceftriaxone is recommended when laboratory examinations are not available.

Failing that:
ampicillin IV at the doses indicated above. Change to oral treatment as soon as possible with **amoxicillin** PO to complete 8 to 10 days of treatment.

– Supportive therapy
  - Ensure that the patient is well fed and well hydrated (infusions or nasogastric tube if necessary).
  - Seizures (see *Seizures*, page 23).
  - Coma: nursing +++ (prevention of bed sores, care of the mouth and eyes).
  - Pupura with septic shock (see *Shock*, page 17).

Prevention in an epidemic context

– Mass vaccination adapted to the responsible strain (bivalent vaccine A + C or trivalent vaccine A + C + W 135) must be decided for the target population. A single injection protects for 3 to 5 years.
– No chemoprophylaxis. For close contacts: vaccination, information and epidemiological surveillance +++.

Tetanus

– Tetanus is caused by the toxin of *Clostridium tetani*. Neonatal tetanus is responsible for one half of infant deaths in Africa, although it is entirely preventable by vaccination. The disease does not confer immunity and is not contagious.
– In unvaccinated persons, any injury of the skin or mucous membranes carries a risk of tetanus: accidental wound, obstetrical or surgical procedures, injection using soiled equipment, traditional practices during childbirth, circumcision, excision, chronic wounds (leg ulcers, etc.). Neonatal tetanus is caused by contamination of the umbilical cord.
– *Clostridium tetani* is found in soil as well as in animal and human faeces. Spores are resistant to various disinfectants.

Clinical signs

– The first sign is trismus: contraction of the masseters producing difficulty opening the jaws: this begins with difficulty in chewing, and then the jaws become totally locked. The contraction then spreads to the face (fixed smile and elevated eyebrows: risus sardonicus) and to the pharynx (difficulty in swallowing).
– After 2 days, generalised, prolonged and painful muscle spasms: arched back (opisthotonos), flexed arms and extended legs. Recurrent paroxysmal spasms are triggered by any sensory stimulation. Consciousness is not impaired.
– Average duration: 3 weeks.
– Complications: asphyxia as a result of thoracic or laryngeal spasms; inhalation of vomit, aspiration pneumonia.
– Neonatal tetanus occurs within 4 to 21 days after birth. It starts as an inability to suckle (as a result of the trismus) and fixed smile (spasm of the muscles of the mouth). Rigidity of the muscles progress to become generalized, as in adults.

Treatment

– The patient should be hospitalised in a quiet, dark, single room.
– Cleansing and debridement of any deep wounds (see page 247) after sedating the patient.
– Sedation: use **diazepam**
The dose and the frequency of administration must be adapted to the patient's condition. The objective is to find a level that suppresses muscle spasms without depressing respiration. For information:

Children and adults: 0.1 to 0.3 mg/kg by slow IV injection to be repeated every one to 4 hours

For IV administration, dilute 2 ml (10 mg) of diazepam in 8 ml of 5% glucose or 0.9% sodium chloride.

⚠ There is a high risk of respiratory depression or arrest when using high doses of diazepam. Patients must always be cared for in an intensive care unit with intubation and ventilation equipment ready at hand.

– Systemic antibiotic treatment for 10 days:
metronidazole IV
Children: 22.5 mg/kg/day in 3 divided doses given at 8-hour intervals
Adults: 1.5 g/day in 3 divided doses given at 8-hour intervals

Failing that:
benzylpenicillin IV
Children: 150 000 IU/kg/day in 4 divided doses given at 6-hour intervals
Adults: 10 MIU/day in 4 divided doses given at 6-hour intervals

Then change to oral treatment depending on the clinical progress with:
phenoxymethylpenicillin (**penicillin V**) by nasogastric tube
Children: 100 000 IU/kg/day in 4 divided doses (62.5 mg/kg/day)
Adults: 1.6 MIU/day in 4 divided doses (2 g/day)

– Systematic serotherapy:
human tetanus immunoglobulin IM
Neonate: 1500 IU to be injected in 2 different sites
Children and adults: 3000 IU to be injected in 2 different sites

Failing that:
equine tetanus antitoxin obtained from horse serum and administered after testing for anaphylactic reactions[1]
Neonates: 1500 IU
Adults: 10 000 IU

– Administer fluids, electrolytes and calories by infusion or nasogastric tube. In neonates: mother's breast milk extracted using a pump is administered by nasogastric tube.

– Nursing care:
  • Avoid noise and painful procedures which could trigger spasms.
  • Handle the patient as little as possible, gently and under sedation: change the patient's position every 3 hours; gently aspirate the nose and oropharynx.
  • Lay the patient on his side on a soft surface (place neonates on urine bags filled with water and covered with cloth).
  • For IV injections: inject into the infusion tubing.

Prevention

– Antitetanus vaccination of all children as of 6 weeks of age; 3 IM injections given 4 weeks apart followed by a booster dose after one year, 5 years and then every 10 years.

– Prevention of neonatal tetanus:
  • Vaccination of pregnant women: 2 injections during pregnancy (one injection at the beginning of pregnancy, the other at the end of the pregnancy. Failing that, allow an interval of one month between the 2 injections).

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1 Testing for anaphylactic reactions: inject 0.1 ml by SC and wait 15 minutes. In the absence of an allergic reaction (no erythema at the site of injection or a flat erythema measuring less than 0.5 cm in diameter), inject 0.25 ml SC. If there has been no reaction after 15 minutes, inject the rest of the product by IM.
If an anaphylactic reaction occurs, administer **epinephrine** (**adrenaline**) IM and repeat every 5 minutes until improvement.
Infants and children: 0.01 mg/kg/injection
Adults: 0.25 to 0.75 mg/injection
Insert an IV line. In the event of anaphylactic shock, see *Shock*, page 17.

- Vaccination of all women of childbearing age: administer 5 injections over childbearing years.
- Hygiene during childbirth, train midwives in umbilical cord care.

– In the event of a wound:
- Clean and disinfect the wound (see page 247); ablation of any foreign body.
- Check the patient's vaccination status:

Risk	**Patient completely vaccinated** The last booster dates back:			**Patient not vaccinated, partially vaccinated** (less than 3 doses), or **status unknown**
	less than 5 years	more than 5 years	more than 10 years	
Low (1)	none	none	booster	begin or complete the vaccination
High (2)	antibiotherapy	antibiotherapy booster	antibiotherapy serotherapy booster	antibiotherapy serotherapy begin or complete the vaccination

(1) Low risk: minor wounds.
(2) High risk: war wounds (firearms, explosives), deep wounds, substantial tissue loss, extensive burns, foreign bodies, necrosis, wounds older than 6 hours.

- Inject the vaccine and serum at 2 separate sites and using 2 different syringes.
  Serotherapy:
  human tetanus immunoglobulin IM: 250 IU as a single dose
  or failing that, **equine tetanus antitoxin** IM: 1500 IU after testing for anaphylactic reactions (see note, previous page)
  Regardless of the product used, double the dose if the injury is older than 24 hours, if the wound is large or infected, in the event of burns or shock with haemorrhage, and in patients over 90 kg.
  Vaccination: 2nd dose after one month; booster after one year, then every 10 years.
- Antibiotic treatment: **phenoxymethylpenicillin** (**penicillin V**) for 5 days.

Typhoid fever

– Systemic infection due to *Salmonella typhi*. The organism enters the body via the gastrointestinal tract and gains access to the bloodstream via the lymphatic system.
– Typhoid fever is acquired by ingestion of contaminated water and food or by direct contact (dirty hands).

Clinical signs

– Sustained fever (lasting more than one week), headache, asthenia, insomnia, anorexia, epistaxis.
– Abdominal pain or tenderness, diarrhoea or constipation, gurgles.
– Toxic confusional state, prostration.
– Moderate splenomegaly, relative bradycardia (normal pulse despite fever).

– *Differential diagnosis* may be difficult as symptoms resemble those of lower respiratory tract infections, urinary infections, and malaria or dengue fever in endemic areas.
– *Complications* can occur during the active phase or during convalescence (even during treatment): intestinal perforation or haemorrhage, peritonitis, myocarditis, encephalitis, coma.

Laboratory

– Relative leukopenia (normal white blood cell count despite septicaemia).
– Isolation of *S. typhi* from blood cultures (take at least 10 ml of blood) and stool cultures during the first 2 weeks.
– Widal's agglutination reaction is not used (both sensitivity and specificity are poor).

Treatment (at hospital level)

– Isolate the patient.
– Keep under close surveillance, hydrate, treat fever (see *Fever*, page 26).
– Antibiotic therapy: case-fatality rates of 10% can be reduced to less than 1% with early antibiotic treatment based on the findings of blood cultures. The oral route is more effective than the parenteral route. If the patient cannot take oral treatment, start by injectable route and change to oral route as soon as possible.

Antibiotic treatment (except during pregnancy or breast-feeding)

- The treatment of choice is: **ciprofloxacin** PO for 5 to 7 days
  Children: 30 mg/kg/day in 2 divided doses (usually not recommended in children under 15 years, however, the life-threatening risk of typhoid outweighs the risk of adverse effects)
  Adults: 1 g/day in 2 divided doses

cefixime PO for 7 days may be an alternative to ciprofloxacine in children under 15 years:
Children over 6 months: 15 to 20 mg/kg/day in 2 divided doses

Failing that, and in the absence of resistance:
amoxicillin PO for 14 days
Children: 75 to 100 mg/kg/day in 3 divided doses
Adults: 3 g/day in 3 divided doses
or
chloramphenicol PO for 10 to 14 days depending on severity
Children: 100 mg/kg/day in 3 divided doses
Adults: 3 g/day in 3 divided doses

- S. *typhi* is rapidly developing resistance to quinolones. In this event, use:
  ceftriaxone IM or IV[1] for 10 to 14 days depending on severity
  Children: 75 mg/kg once daily
  Adults: 2 to 4 g once daily

Antibiotic treatment in pregnant or breast-feeding women

In pregnant women, typhoid carries a major risk of maternal complications (intestinal perforation, peritonitis, septicaemia) and foetal complications (miscarriage, premature delivery, intrauterine death).

- In the absence of resistance:
  amoxicillin PO: 3 g/day in 3 divided doses for 14 days
- If resistance:
  ceftriaxone IM or IV[1]: 2 to 4 g once daily for 10 to 14 days depending on severity
  Failing that, use **ciprofloxacin** PO (usually not recommended for pregnant or breast-feeding women. However, the life-threatening risk of typhoid outweighs the risk of adverse effects). For dosage, see above.

Note: fever persists for 4 to 5 days after the start of treatment, even if the antibiotic is effective. It is essential to treat the fever and to check for possible maternal or foetal complications.

– In patients presenting severe typhoid, with toxic confusional state (hallucinations, altered consciousness) or intestinal haemorrhage:
dexamethasone IV: loading dose 3 mg/kg and then 1 mg/kg every 6 hours for 2 days

Prevention

– Disinfection of faeces with 2% chlorine solution.

– Individual (hand washing) and collective hygiene (safe water supply, sanitation).

– The possibility of vaccination must be considered: it can be useful in some situations (high-risk age group, hyperendemic zone), but its effectiveness remains controversial.

[1] The solvent of ceftriaxone for IM injection contains lidocaine. Ceftriaxone reconstituted using this solvent must NEVER be administered by IV route. For IV administration, water for injection must always be used.

Brucellosis

– A zoonosis that mainly affects domestic animals. It is occasionally transmitted to man by ingestion of infected raw milk, or by contact (with infected animals or with soiled objects through abrasion on the skin). Human-to-human transmission is rare.
– Brucellosis is caused by Gram-negative bacilli of the genus *Brucella*: *B. melitensis* (sheep and goats), *B. abortus* (cattle), *B. suis* (pigs) and less commonly, *B. canis* and *B. ovis*.
– The disease is found worldwide and mainly in rural areas. The true incidence of brucellosis in tropical countries is probably underestimated as it is often undiagnosed.

Clinical signs

The clinical signs and associated symptoms are fluctuating and non specific. Diagnosis is difficult because of the broad spectrum of clinical manifestations.

Acute form

– Common form: gradual onset over one to 2 weeks: undulant fever (up to 39-40°C) lasting 10 to 15 days, night sweats, chills, asthenia, joint and muscle pain. Possible sacroileitis, arthritis (knee) and orchitis.
  In regions where malaria is endemic, the possibility of acute brucellosis should be considered when a high fever persists despite correct anti-malarial treatment.
– Other clinical forms:
  • Typhoid-like form: sudden onset with signs of septicaemia; high fever, typhoid state, delirium, abdominal signs.
  • Subacute form: mild, non-specific clinical signs that do not lead the patient to seek medical attention. Serum test positive.

Secondary brucellosis

Prolonged asthenia, focal signs:
– Bone and joint involvement: arthritis of the hip, sacroileitis, spondylitis with sciatalgia (pseudo-Pott's disease).
– Neurobrucellosis: pseudo-tuberculosis meningitis, meningoencephalitis; a complication at vertebral site involving peripheral nerves may cause motor and/or sensory disorders.

Chronic brucellosis

– General signs; physical and mental asthenia, sweating and polyalgia.
– Focal signs: slow developing bone, neuromeningeal or visceral foci.

Laboratory

– During the acute phase diagnosis can be confirmed by the detection of the pathogen in a blood culture.
– The Rose Bengal test (or card test) can identify specific antibodies. It is a quick, cheap and both specific and sensitive test for the diagnosis of acute and localized forms of brucellosis.

– Other serological tests (Wright's test, ELISA, indirect immunfluorescence and Coombs'test) cannot usually be done.

Treatment

Treatment is based on a combination of 2 antibiotics. Since streptomycin and rifampicin are also used in the treatment of tuberculosis, it is essential to rule out the possibility of active TB before starting treatment (patient history, clinical examination and chest X-ray if possible). Rifampicin must only be used when indicated below.

Acute form

– Children over 8 years and adults (except in pregnant or breast-feeding women):
doxycycline PO
Children: 100 to 200 mg once daily or in 2 divided doses for 6 weeks
Adults: 200 mg once daily or in 2 divided doses for 6 weeks
+ **streptomycin** IM
Children: 15 mg/kg once daily for 2 weeks
Adults: 1 g once daily for 2 weeks

– Children under 8 years
cotrimoxazole PO: 40 mg SMX + 8 mg TMP/kg/day in 2 divided doses for 6 weeks
+ **gentamicin** IM: 7.5 mg/kg once daily or in 2 divided doses for 2 weeks
or **rifampicin** PO: 15 mg/kg once daily for 6 weeks

– Pregnant or breast-feeding women
cotrimoxazole PO: 1600 mg SMX + 320 mg TMP/day in 2 divided doses for 6 weeks
+ **rifampicin** PO: 600 mg once daily for 6 weeks
Note:
In pregnant women, the combination of cotrimoxazole + rifampicin can be administered regardless of the stage of pregnancy if treatment is indispensable.
Administration of vitamin K is recommended to prevent neonatal and maternal haemorrhage.
phytomenadione (vial containing 10 mg/ml, 1 ml):
To the mother: 10 mg/day PO for the 15 days preceding the expected date of delivery
To the newborn: 2 mg PO as a single dose at birth and again after 4 to 7 days

Focal brucellosis

– Same treatment regimen as for the acute form, but for a period of 6 weeks to 3 months depending on severity. Surgical draining of an abscess of the liver or spleen may be indicated.
– Neurobrucellosis or endocarditis: combination of **rifampicin** + **doxycycline** + **gentamicin**.
Antibiotic treatment is not effective in the context of chronic, non-focal brucellosis.

Prevention

– Washing of hands and clothing if in contact with animals.
– Boil milk and avoid eating raw cheese and undercooked meat.

Plague

– A zoonosis caused by the Gram-negative bacillus *Yersinia pestis* that mainly affects wild and domestic rodents.
– Plague is transmitted to man by the bite of an infected flea vector or through a break in the skin by contact with a rodent. Human-to-human transmission occurs through the bites of human fleas, or, in the case of pneumonic plague, by inhaling infected droplets expelled by coughing.
– Vast foci of infection remain in Central and Southeast Asia, Africa, Madagascar, and in North and South America.

Clinical signs and progress

There are 3 main clinical forms:

– *Bubonic plague* is the most common form: high fever, chills, headache, associated with one (or more) very painful lymph node, usually inguinal (bubo). Frequent gastrointestinal signs: abdominal pain, vomiting, diarrhoea, etc. The mortality rate in untreated patients is approximately 50% as a result of septicaemia.
– *Septicaemic plague* is a complication of untreated bubonic plague and is a fulminant illness.
– *Pneumonic plague* is a very contagious form: high fever, chills, headache, myalgia associated with paroxysmal coughing, haemoptysis and respiratory distress. This form progresses rapidly, and is fatal unless treated. It occurs either as a complication of bubonic plague or as the result of a primary infection.

Occasionally, the disease can take the form of *meningitic plague*.

Laboratory

– Isolation of *Y. pestis* (direct examination and culture) from lymph node aspirate, blood, sputum, cerebrospinal fluid, depending on the form involved.
– Serodiagnosis: ELISA reads positive soon after the onset of the illness.
– Transportation of the samples requires a cold chain (failing that, the temperature must be kept below 30°C).

Management and treatment

– When plague is suspected: take samples for cultures and antibiotic sensitivity testing and then treat immediately without waiting for the diagnosis to be confirmed. Inform the health authorities as soon as the diagnosis has been confirmed.

– Isolation:
  • Patients suffering from bubonic plague do not have to be isolated. Treat the patient and his/her bedding and clothing with an insecticide (e.g. **permethrin 0.5%** powder; see *Pediculoses*, page 96). Observe elementary rules of hygiene (wash hands, wear gowns, gloves etc.).
  • Patients with primary or secondary pneumonic plague must be strictly isolated. Their bedding, clothing, sputum and excreta must be disinfected with a chlorinated solution. Observe elementary rules of hygiene (wash hands, wear hospital lab coats, gloves etc.) and both the patient and carers should wear facemasks.

– ***Treatment of suspected or confirmed cases***

If treatment is begun early, recovery is rapid and complete. Penicillins, cephalosporins and macrolides should not be used.
Aminoglycosides, tetracyclines, chloramphenicol and sulphonamides are effective. Follow national recommendations. For information:

streptomycin IM for 10 days
Children: 30 mg/kg/day in 2 divided doses given at 12 hour-intervals
Adults: 2 g/day in 2 divided doses given at 12 hour-intervals

gentamicin IM for 10 days
Neonates and children under one year: 7.5 mg/kg/day in 2 divided doses
Children over one year: 6 mg/kg/day in 2 divided doses
Adults: 3 mg/kg/day in 2 divided doses

doxycycline PO for 10 days
Children over 8 years and adults: 200 mg/day, once daily or in 2 divided doses

chloramphenicol PO or IV for 10 days
Children over one year and adults: 50 mg/kg/day in 4 divided doses given at 6 hour-intervals

Choice of antibiotics

Indications	First choice	Alternative
Bubonic plague	doxycycline	chloramphenicol or streptomycin
Pneumonic plague	streptomycin	–
Septicaemic plague	streptomycin	chloramphenicol
Meningitic plague	chloramphenicol	–
Pregnant or breast-feeding women	gentamicin	–

Note: in order to prevent the emergence of resistance to streptomycin which is used in the treatment of tuberculosis, it is preferable to use doxycycline or chloramphenicol for the treatment of bubonic plague.

– ***Chemoprophylaxis of contacts***

In the event of contact, and within one week after the end of exposure:
doxycycline PO throughout the period of contact (minimum 5 days of treatment)
Children over 8 years and adults: 100 to 200 mg/day, once daily or in 2 divided doses
or
co-trimoxazole PO throughout the period of contact (minimum 5 days of treatment)
Children: 40 mg SMX + 8 mg TMP/kg/day in 2 divided doses
Adults: 1600 mg SMX + 320 mg TMP/day in 2 divided doses

Prevention

– Flea vector control is essential to controlling an epidemic.
– Long-term prevention: environmental sanitation and control of rodent reservoir.
– Vaccination against plague is only indicated for people with a high risk of exposure (laboratory technicians handling rodents) and can in no circumstances be used as a method for controlling an epidemic.

Leptospirosis

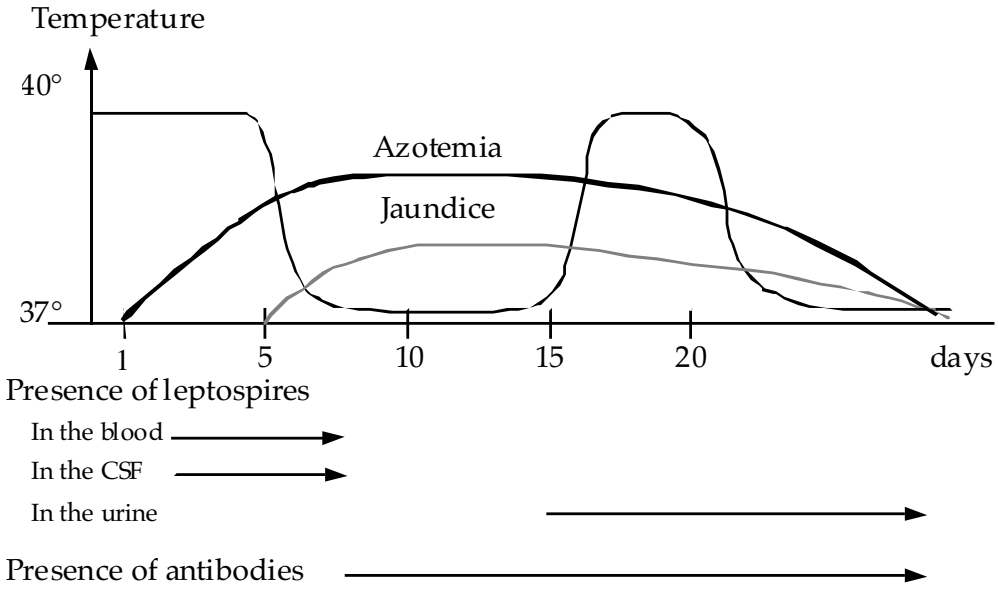
– A zoonosis caused by spirochetes of the genus *Leptospira*, affecting many domestic and wild animals (particularly rodents and principally rats).
– Leptospirosis is acquired by indirect contact (contact of the skin or mucous membranes with animal urine-contaminated water, e.g. when swimming) and less commonly, by direct contact with infected animals.

Clinical signs

Diagnosis is difficult because of the broad spectrum of clinical manifestations. A distinction is usually made between the mild form (the most common, usually with a favourable outcome) and the severe form (multiple organ dysfunction syndrome).

– **Mild form**
  • After an incubation period of one to 3 weeks: influenza-like illness (high fever, chills, headache, myalgias), often combined with gastrointestinal disorders (anorexia, abdominal pain, nausea, vomiting) and possible pulmonary signs (cough, chest pain). Other signs: conjunctival haemorrhage, hepatosplenomegaly, and multiple adenopathies. Mild jaundice may be present, but this form is usually anicteric.
  • The signs regress after 5 to 6 days, and then reappear, sometimes with meningeal invasion, which may be complicated by encephalitis or myelitis.
– **Severe form or Weil's syndrome**
  The onset of the disease is the same as in mild form. After a few days, acute hepatorenal manifestations with fever, jaundice, oligo-anuric renal failure; diffuse haemorrhagic syndrome (purpura, ecchymoses, epistaxis etc.), pulmonary signs (cough, chest pain, haemoptysis) and cardiac signs (myocarditis, pericarditis).

Temperature chart and progress of leptospirosis



Laboratory

– Isolation through culture of leptospires from blood, cerebrospinal fluid (during the first phase) or urine (during the second phase).
– Serodiagnosis: immunofluorescence or ELISA (antibodies are detected from Day 8).
– Blood cell count: polymorphonuclear leukocytosis.
– If meningeal syndrome: lumbar puncture yields a clear fluid, usually with raised leucocyte count and elevated protein level (about 1 g/litre).
– Urine: proteinuria, leukocyturia, possible haematuria and presence of casts.

Treatment

– Rest and treatment of fever: **paracetamol** PO (see *Fever*, page 26).
Acetylsalicylic acid (aspirin) is contraindicated (risk of haemorrhage).

– Antibiotic treatment should be started as soon as possible:

- *Moderate form*
amoxicillin PO
Children: 50 mg/kg/day in 2 or 3 divided doses for 7 days
Adults: 2 g/day in 2 or 3 divided doses for 7 days
or
doxycycline PO (except in pregnant or breast-feeding women and children under 8 years)
Children over 8 years: 100 mg/day in 2 divided doses for 7 days
Adults: 200 mg/day in 2 divided doses for 7 days
or
erythromycin PO
Children: 50 mg/kg/day in 2 or 3 divided doses for 7 days
Adults: 2 to 3 g/day in 2 or 3 divided doses for 7 days
- *Severe form*
ampicillin IV
Children: 100 mg/kg/day in 3 injections
Adults: 4 to 6 g/day in 3 injections
Switch to the oral route as soon as possible, with **amoxicillin** to complete 7 days of treatment.
or
erythromycin IV
Children: 50 mg/kg/day in 3 or 4 injections
Adults: 2 g/day in 4 injections
Switch to the oral route as soon as possible to complete 7 days of treatment.

Prevention

– Avoid bathing in endemic areas.
– Rodent control, environmental sanitation (particularly water).
– Vaccination is restricted to personnel exposed in the course of their work.

Borrelioses or relapsing fever

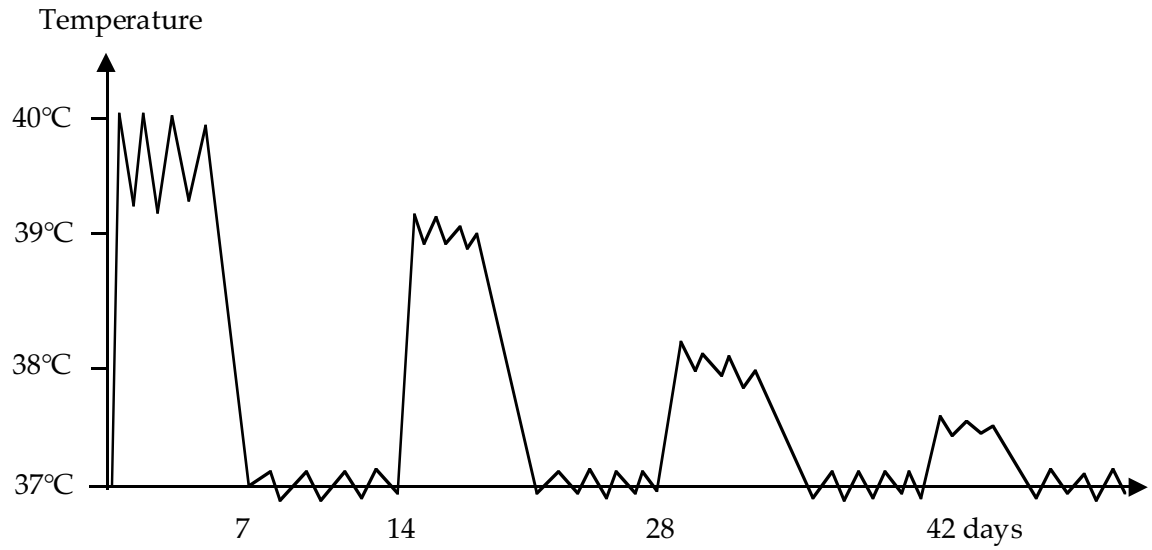
– Infections due to spirochetes of the genus *Borrelia*, transmitted to man by arthropod vectors (body lice or ticks).
– **Louse-borne relapsing fever** (*B. recurrentis*) can occur as an epidemic when favourable conditions arise: overcrowding, poor hygiene, famine, war, cold. It is often associated with epidemic louse-borne typhus (see *rickettsiosis*, page 176).
– **Tick-borne relapsing fever** (*B. hispanica*, *B. persica*, *B. duttoni*, *B. venezuelensis*, etc.) is found in localised areas throughout the world.

Clinical signs

Louse-borne relapsing fever

– Recurrent febrile episodes, separated by afebrile periods:
The initial attack lasts about 7 days: high fever, with chills, gastrointestinal disturbances, generalised pain, headache, mental confusion, meningeal syndrome, splenomegaly, sometimes epistaxis and jaundice. It ends in a crisis lasting 10 to 20 minutes with a rise in temperature, pulse rate, respiratory rate and blood pressure, followed by a fall in temperature with profuse sweating and hypotension, which may last for several hours.
During an afebrile interval (lasting several days), the splenomegaly declines but the patient remains asthenic.
Then one or several relapses of fever. The episodes become progressively less severe, and the patient develops temporary immunity.
– Complications:
  • collapse during defervescence;
  • myocarditis, severe hepatonephritis, encephalitis, haemorrhage, miscarriage.

Temperature chart of relapsing fever



Tick-borne relapsing fever

Clinical manifestations are similar, with species-related variations.

Laboratory

– Detection of *Borrelia* in thin and thick blood films during febrile periods; Giemsa staining.
– Repeat the examination if the smear is negative despite strong clinical suspicion.

Treatment

Louse-borne relapsing fever and tick-borne relapsing fever

– Antibiotherapy:
doxycycline PO
Children: 100 mg as a single dose
Adults: 200 mg as a single dose
or **chloramphenicol** PO (except in pregnant or breast-feeding women)
Children: 25 mg/kg as a single dose (without exceeding 750 mg)
Adults: 500 mg as a single dose
or **erythromycin** PO
Children: 12.5 mg/kg as a single dose (without exceeding 500 mg)
Adults: 500 mg as a single dose

– Symptomatic treatment of the pain and fever (paracetamol); hydration.

– Elimination of body lice (page 96).

Note: doxycycline is usually contra-indicated in children under 8 years and in pregnant or breast-feeding women. However, if erythromycin is not available, it may be used in the treatment of borrelioses; the administration of a single dose should not, in theory, provoke any adverse effects.

⚠ A Jarisch-Herxheimer reaction may develop after the start of antibiotic treatment (high fever, chills, tachycardia and hypertension followed by profuse sweating, hypotension and sometimes heart failure and shock). Treatment is symptomatic: paracetamol to reduce the fever; management of shock in very severe reactions (page 17).

Prevention

Louse-borne relapsing fever

– Control body lice (page 96).

Tick-borne relapsing fever

– Control ticks and rodents.
– Individual protection (avoid bites by wearing clothing and using repellents).

Eruptive rickettsioses

Eruptive fevers caused by bacteria of the genus *Rickettsia* and transmitted to man by an arthropod vector. Three main groups are distinguished: typhus group, spotted fever group and scrub typhus group.

Clinical signs: see next page

Laboratory

Detection of specific IgM of each group by indirect immunofluorescence. The diagnosis is confirmed by 2 serological tests at an interval of 10 days. In practice, clinical signs and the epidemiological context are sufficient to suggest the diagnosis and start treatment.

Treatment

– Symptomatic treatment:
  • Hydration (PO or IV if the patient is unable to drink)
  • Fever: **paracetamol** PO (see *Fever*, page 26). Acetylsalicylic acid (aspirin) is contra-indicated due to the risk of haemorrhage.
– Antibiotherapy[1] for 7 days or until 2 days after the fever has disappeared:
  doxycycline PO (except in children under 8 years and pregnant or breast-feeding women):
  Children over 8 years: 100 to 200 mg once daily or in 2 divided doses
  Adults: 200 mg once daily or in 2 divided doses
  or **chloramphenicol** PO (except in pregnant or breast-feeding women)
  Children: 50 to 75 mg/kg/day in 3 divided doses
  Adults: 2 g/day in 3 divided doses
– In pregnant or breast-feeding women:
  josamycin PO[2]: 3 g/day in 3 divided doses for 8 days
– In a context of *epidemic typhus*, **doxycycline** PO 200 mg as a single dose is the choice treatment, but there is a risk of recurrence.
  Note: doxycycline is usually contraindicated in children under 8 years and in pregnant or breast-feeding women. However, the administration of a single dose should not, in theory, provoke adverse effects. Check national recommendations.

Prevention

– Epidemic typhus: control of body lice (page 96).
– Murine typhus: control of fleas and then rats.
– Spotted fevers: avoid tick bites by wearing clothing and using repellents.
– Scrub typhus: use of repellents, chemoprophylaxis with **doxycycline** PO (200 mg once weekly in adults).

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1 Unlike borrelioses, antibiotic treatment of rickettsioses does not provoke a Jarisch-Herxheimer reaction. However, the geographical distribution of borrelioses and rickettsioses may overlap, and thus a reaction may occur due to a possible co-infection (see *Borrelioses*, page 174).

2 Only some macrolides can be used. Erythromycin is not effective.

Clinical signs

– Common to all forms:
- Sudden onset of fever (temperature of over 39°C) with severe headache and myalgias.
- 3 to 5 days later; onset of generalised cutaneous eruption (see below).
- Hypotension; non-dissociated rapid pulse (variable).
- Typhoid state: prostration, omnubilation, confusion and extreme asthenia, particularly marked in typhus forms.
- Inoculation eschar: painless, black crusted lesion surrounded by a erythematous halo at the site of the bite. Always check for this significant sign.
- Non-cutaneous signs vary from one form to another, and are atypical and variable (see below).

Group	**Typhus**		**Spotted fever**			**Scrub typhus**
Form	Epidemic typhus	Murine typhus	Mediterranean spotted fever	Rocky Mountain spotted fever	Other Old-World tick-borne fevers	Scrub typhus
Pathogen	*R. prowasekii*	*R. typhi*	*R. conorii*	*R. rickettsii*	*R. sibirica, R. australis*	*O. tsutsugamushi*
Vector	body lice	rat fleas	ticks	ticks	ticks	mites
Reservoir	**man**	rats	dogs	rodents	rodents, dogs, etc.	rodents
Occurence	**epidemic**	endemic	endemic	endemic	endemic	sporadic
Geographical distribution	worldwide, conflicts; main sites Burundi/Rwanda, Ethiopia	worldwide	around the mediterranean, Sub-Saharan Africa	North America, Central America, Columbia, Brazil	Southern Africa, Australia, Siberia	Far-east, India, South Pacific
Rash	maculopapular	maculopapular	maculopapular	purpural	maculopapular	macular
Eschar	0	0	**black necrotic area**	rare	**black necrotic area**	**black necrotic area**
Typhoid state	+++	+++	+/-	+/-	+ /-	+++
Extra-cutaneous signs	cough, myalgia meningeal signs	gastrointestinal signs	meningeal signs	gastrointestinal and neurological signs, hypotension	variable	meningeal signs
Case fatality (%)	30 (without treatment)	5	2	5	1	0-30

– Complications can be severe, and sometimes fatal: encephalitis, myocarditis, hepatitis, acute renal failure, haemorrhage etc.

CHAPTER 8

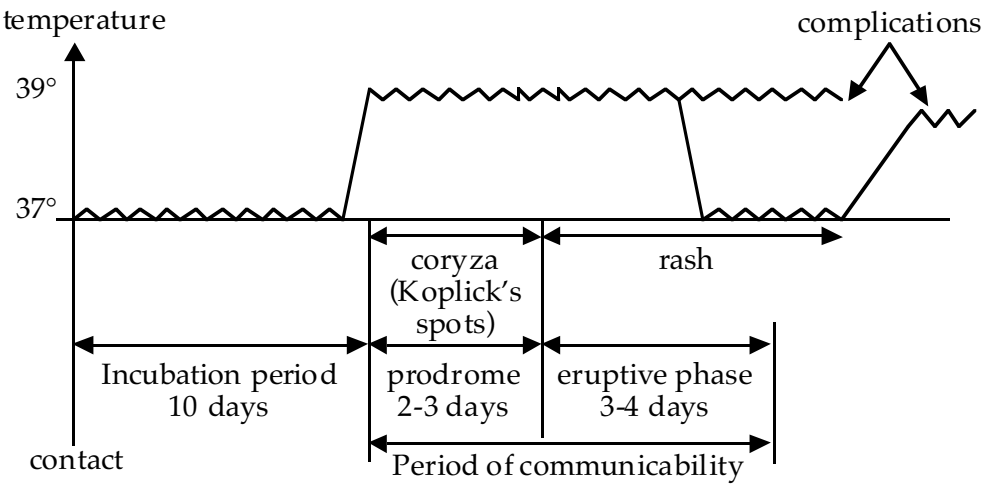
Viral diseases

Measles

– Measles is a highly contagious viral infection. Human-to-human transmission is direct, by inhalation of respiratory droplets spread by infected individuals. Humans are the only reservoir of the virus.
– In populations living in poor socio-economic conditions, the disease mainly affects recently weaned children, between 1 and 3 years of age. Mortality from measles complications may be as high as 25% in urban areas or refugee camps. The risk of death is higher among very young and malnourished children.
– Measles is an endemic disease. The frequency of epidemics decreases as vaccination coverage increases.

Clinical signs

Temperature curve and clinical evolution of measles



– ***Prodomal phase***: this phase lasts for 2 to 3 days with fever (39°C-40°C), cough, coryza and/or conjunctivitis. Koplik's spots (small spots with bluish-white centres on a erythematous base on the buccal mucosa or gums) are transient. If seen, they are pathognomonic for measles.
– ***Eruptive phase***: this phase begins on average 3 days after the onset of symptoms and lasts for an average of 6 days. An erythematous maculopapular rash begins on the forehead, then spreads to the face, neck, thorax (2nd day), abdomen and lower limbs (3rd and 4th day). The fever disappears once the rash reaches the feet.
– ***Period of communicability***: from 3-4 days before the appearance of the rash to 5 days afterwards.
– Recovery begins around the 5th day; the rash fades, descending from the head to the feet, leaving marked desquamation on pigmented skin.

Complications

Complications are common and should be systematically looked for. Pneumonia and diarrhoea are the most common causes of death.
– Respiratory and ENT complications: pneumonia, otitis media, laryngitis, bronchitis.
– Gastrointestinal complications: diarrhoea with risk of dehydration, stomatitis.
– Ophthalmic complications: conjunctivitis with risk of corneal ulceration, keratitis and blindness. Patients with vitamin A deficiency are at a high risk for developing xerophthalmia and blindness.
– Severe acute malnutrition may be provoked or aggravated by measles.
– Rarely, neurological complications: encephalitis (1 case in 1000).

Treatment

The objective is to decrease mortality by preventing complications.

Systematic prevention of complications (at hospital level)
– Treat fever (see page 26) and clear the airway (nasal irrigation with 0.9% sodium chloride or Ringer Lactate 4 to 6 times/day).
– Prevention of ophthalmic complications:
  • clean the eyes with 0.9% sodium chloride or Ringer Lactate
  • apply **1% tetracycline eye ointment** 2 times/day for 5 days
  • systematically give **retinol** (**vitamin A**) at curative doses:
    Children from 6 months to 1 year: 100 000 IU once daily on Day 1, Day 2 and Day 8
    Children over 1 year: 200 000 IU once daily on Day 1, Day 2 and Day 8
    The administration of vitamin A reduces both the risks of complications and of death.
– Prevention of dehydration: ensure the patient drinks. In patients with diarrhoea, give **ORS** (follow *Treatment plans A, B or C to treat dehydration*, WHO, annexes 2a, 2b, 2c, 2d, pages 331 to 337).
– Prevention of malnutrition: continue breastfeeding; give food supplements during the disease and during convalescence.
– Prevention of secondary infections: systematic treatment with high dose antibiotics for children at high risk of complications and death (severely malnourished children, HIV infected children etc.):
amoxicillin PO: 80 mg/kg/day in 2 or 3 divided doses for 5 days

Treatment of complications or associated diseases:
– Pulmonary or ENT: see Chapter 2
– Gastrointestinal: see Chapter 3
– Ophthalmic: see Chapter 5
– Malaria: see page 127

Prevention

– Routine vaccination (EPI): 0.5 ml as a single dose by deep SC or IM injection after the age of 9 months.
– 2 dose vaccination: during an epidemic or when there is a high risk of morbidity or mortality (overcrowding, refugee camps, malnourished children, HIV infected children): vaccinate children from the age of 6 months to 12 to 15 years. Children who are vaccinated between the ages of 6 and 9 months must receive a second dose after their first birthday.

Poliomyelitis

– Poliomyelitis is an acute viral infection due to a poliovirus (serotypes 1, 2 and 3). Human-to-human transmission is direct (faecal-oral) or indirect (ingestion of food and water contaminated by stool). Humans are the only reservoir of the virus. In principle the disease can be eradicated by mass vaccination with oral polio vaccine (OPV).
– In endemic areas, epidemics usually affect children under 5 years of age. In non-endemic areas, where vaccination coverage is low, young adults are most commonly affected.

Clinical signs

– In more than 90% of cases, infection is asymptomatic.
– *Non-paralytic form*: a non-specific febrile illness with muscle pain, headache, vomiting, backache; no neurological involvement.
As spontaneous recovery usually occurs within 10 days, diagnosis is rarely made outside epidemic contexts.
– *Paralytic form*: in less than 1% of cases, after the non-specific signs, the patient develops rapid onset (from the morning to the evening) asymmetrical acute flaccid paralysis, predominantly of the lower limbs, with ascending progression. The muscles become soft with diminished reflexes. Sensation is maintained. The disease is life threatening if paralysis involves the respiratory muscles or muscles of swallowing. Initial urinary retention is common. Gastrointestinal disturbances (nausea, vomiting, diarrhoea), muscle pain and meningeal symptoms may also occur.

Laboratory

Look for the polio virus in stool samples. The virus is excreted for one month after infection, but only intermittently; therefore, 2 samples must be collected with an interval of 48 hours.

Treatment

– Hospitalise patients with the paralytic form: rest, prevent bed sores in bedridden patients, give analgesics (do not give IM injections to patients in the febrile phase), ventilate patients with respiratory paralysis.
– Physiotherapy once the lesions are stable to prevent muscle atrophy and contractures.
– Care for sequelae: physiotherapy, surgery and prosthetics.

Patients with acute flaccid paralysis (AFP)

– Consider all patients with AFP as suspected cases of poliomyelitis.

– Confirm the diagnosis by isolating the virus: send the 2 stool samples to a reference laboratory, with a clinical description of the patient. The stool samples must be stored and transported between 0°C and 8°C.

– While waiting for laboratory confirmation, vaccinate all children under 5 years of age living in the area (from the same village or neighbouring villages), irrespective of their vaccination status.

– Once the case is confirmed, organize a mass vaccination campaign: the area and the age group are determined as a function of epidemiological data.

– Surveillance: for each case of AFP there are between 100 and 200 subclinical cases. Therefore, active surveillance to detect new cases is essential for epidemic control.

Prevention

– 2 types of vaccines exist:
  • an injectable inactivated poliovirus vaccine (IPV)
  • a trivalent oral attenuated poliovirus vaccine (OPV)

  In developing countries and during poliomyelitis eradication campaigns, the OPV is recommended for economic reasons, ease of administration and particularly for epidemiological reasons: it induces a rapid intestinal immunity (epidemic) and group protection due to its secondary diffusion into the natural environment

– Vaccination schedule with OPV
  The WHO recommends 4 doses before 1 year of age:

Primary vaccination		Booster doses
Birth	OPV-0*	One year after the last dose and at the age of 6 years
6 weeks	OPV-1	
10 weeks	OPV-2	
14 weeks	OPV-3	

* If the first dose (OPV-0) is not administered at birth, give the 4th dose a minimum of 1 month after the 3rd dose, for example at the same time as measles vaccination.

Rabies

Rabies is a viral zoonose transmitted to man by contact with the saliva of an infected animal (dogs, foxes, bats etc.).

Clinical signs

– Incubation period: 3 to 12 weeks (exceptionally shorter or longer).
– Prodromal phase (2 to 4 days): non-specific infection; pain and paresthaesia around the bite.
– Acute phase: hyperexcitability, agitation, painful laryngeal spasms and hydrophobia (furious rabies); ascending paralysis (paralytic rabies).

Post-exposure treatment

– Local treatment of the wound:
  • Immediately wash carefully with soap and water, rinse, apply **10% polyvidone iodine** or **70% ethanol**.
  • If the wound is a bite: excise the necrotic tissue (do not suture; if sutures are required, wait 24 to 48 hours before suturing) and infiltrate the wound with rabies immunoglobulin (see next page).
– Antibiotic treatment
– Tetanus prophylaxis
– Administration of rabies vaccine and/or rabies immunoglobulin: see table below.

Guide for post-exposure treatment *(from WHO)*

Category	Type of contact	Treatment
I	Contact with animals Licks on intact skin	None, if a reliable case history is available
II	*Minor exposure*: – Minor scratches or abrasions without bleeding – Licks on broken skin	– Administer rabies **vaccine** immediately. – Stop treatment if animal remains healthy throughout an observation period of 10 days or if animal is found to be negative for rabies by appropriate laboratory techniques.
III	*Major exposure*: – Transdermal bites or scratches – Contamination of mucous membranes with the animal's saliva (licks)	– Administer rabies **immunoglobulin** and **vaccine** immediately. – Stop treatment if animal remains healthy throughout an observation period of 10 days or if animal is found to be negative for rabies by appropriate laboratory techniques.

– **Vaccination**
Several types of vaccines and several vaccination schedules exist.
Vaccines prepared from human diploid cells, Vero-cells or from duck-embryos should replace the vaccines prepared from the brain tissue of animals.
Vaccines must be administered IM into the deltoid muscle (or into the antero-lateral aspect of the thigh in young children). Never administer rabies vaccine into the gluteal region.

Administration of rabies vaccine according to the vaccination status

Incomplete vaccination or no vaccination or vaccination completed more than 5 years ago	**Vaccination completed less than 5 years ago**
rabies vaccine, 4 doses: 2 doses on Day 0 (one dose in each arm), then one dose on Day 7 and Day 21 or rabies vaccine, 5 doses: one dose on Day 0, Day 3, Day 7, Day 14 and Day 28 *(+ rabies immunoglobulin for all patients with category III contact, see below)*	rabies vaccine, 2 doses: one dose on Day 0 and Day 3 *(+ rabies immunoglobulin for all patients with category III contact, see below)*

– **Passive immunisation**
Passive immunisation is indicated for category III contact and must be given as quickly as possible:
human rabies immunoglobulin: 20 IU/kg (half the dose should be infiltrated into and around the wound, the other half should be given by IM injection in a different site than used for the vaccination)
or failing that, **equine antirabies serum**: 40 IU/kg (following the same procedure). If using equine serum, test the patient's sensitivity using the Besredka method[1].

[1] Besredka method: inject 0.1 ml SC and wait 15 minutes. If there is no allergic reaction (no erythema at the injection site or a flat erythema of less than 0.5cm diameter), inject a further 0.25 ml SC. If after 15 minutes there is no reaction, inject the rest of the product.
In the event of an anaphylactic reaction, give **epinephrine** (**adrenaline**) IM, repeat every 5 minutes if there is no improvement:
Infants and children: 0.01 mg/kg/injection
Adults: 0.25 to 0.75 mg/injection.
Insert an IV line. In the event of anaphylactic shock, see *Shock*, page 17.

Viral hepatitis

– Several viral infections of the liver are grouped under the heading of viral hepatitis: hepatitis A, B, C, Δ (delta) and E.
– The different hepatitis viruses are present throughout the world, but their prevalence varies by country. Hepatitis A and B are common in developing countries where nearly the entire population is infected during childhood or adolescence.
– The clinical characteristics of all five diseases are similar enough to make differential diagnosis difficult; however, there are epidemiological, immunological and pathological differences. Patients with hepatitis B, C and Δ may later develop chronic liver disease or even hepatocellular carcinoma.
– The main characteristics of each type of viral hepatitis are summarized in a table on the next page.

Clinical signs

– **Asymptomatic forms**
Mild or anicteric forms are the most common, irrespective of the causal virus. The risk of developing later complications from hepatitis B, C and Δ are the same as for symptomatic patients.

– **Classic forms**
Insidious or sudden onset with symptoms of varying intensity: fever, fatigue, nausea, gastrointestinal disturbance, followed by jaundice, dark coloured urine and more or less clay-coloured stool.

– **Fulminant forms**
Hepatocellular failure with severe, often fatal, cytolysis. This form is most frequent in hepatitis B patients with secondary infection with the Δ virus, and in pregnant women infected with hepatitis E during their third trimester (20% mortality).

– **Chronic hepatitis**
Hepatitis B, C and Δ may lead to cirrhosis or hepatoma.

Main profiles observed in different clinical scenarios during HBV infection

Ag HBs	anti-HBs antibodies	anti-HBc antibodies	anti-HBc IgM	Ag HBe	anti-HBe antibodies	HBV DNA	Interpretation
+	(–)	(–)	+	(+)	(–)	(+)	Acute hepatitis
+/–	–	+	–	–	+/–	–	Acute hepatitis, recovery phase
–	+/–	+	–	–	–	–	Post-infectious immunity (cured)
+	–	+	+/–	+	–	+	Chronic hepatitis (wild virus)
–	+	–	–	–	–	–	Post-vaccination immunity

The tests in parentheses are not useful for diagnosis.

	Hepatitis A	Hepatitis B	Hepatitis C	Hepatitis Δ	Hepatitis E
Age group most at risk	Children	Young adults	Young adults	Young adults	Young adults
Transmission	Faecal-oral Contaminated food and water Transfusion (rare)	Blood and blood products Sexual Material contaminated with blood Vertical (mother-to-child)	Blood and blood products Sexual: low Material contaminated with blood (low) Probably vertical	Blood and blood products Sexual Material contaminated with blood Possibly vertical	Faecal-oral Contaminated food and water
Incubation period	2 to 6 weeks	4 to 30 weeks (average 10 weeks)	2 to 25 weeks	Co-infection B/Δ: as for hepatitis B Secondary infection of hepatitis B: approximately 5 weeks	2 to 8 weeks
Period of communicability	Precedes signs. Brief: < 10 days after the appearance of jaundice Most infectious at the end of incubation period.	Precedes signs and lasts entire active period. Can persist in chronic carriers.	Precedes signs. Duration is not well known, probably the same as for hepatitis B. Could persist beyond normalisation of transaminases.	Precedes signs. Duration is not well known, probably the same as for hepatitis B.	Precedes signs. Duration is not well known (10 to 15 days after the appearance of jaundice)
Fulminant forms	0.2 to 0.4%	1 to 3%	More rare than in hepatitis B	Much more common in patients with secondary infection of hepatitis B than in patients with B/Δ co-infection	20% mortality in pregnant women
Prognosis	No chronic forms	Chronicity: 0.2 to 10% of which 5 to 15% progress to cirrhosis. Hepatoma possible	Chronicity: up to 50%, of which 10 to 25% progress to cirrhosis. Hepatoma possible	Chronicity: 2 to 5% for patients with B/Δ co-infection; > 90% if secondary infection of hepatitis B (rapid cirrhosis)	No chronic forms
Individual prevention	Polyvalent immunoglobulin	Specific anti-HBs immunoglobulin Safe sex (condoms)	Specific anti-HBs immunoglobulin may be effective	As for hepatitis B (the Δ virus can only develop with B)	Does not exist
Vaccination	Anti-hepatitis A	Anti-hepatitis B	Does not exist	Anti-hepatitis B	Does not exist
Collective prevention	Hygiene, sanitation	Limit transfusion, screen blood prior to transfusion Single use of disposable material			Hygiene, sanitation

Treatment

– Rest, hydration, no special diet.
– Drug therapy for symptomatic treatment (analgesics, antipyretics, antidiarrhoeals, antiemetics etc.) during the acute phase is contra-indicated as it may aggravate symptoms and the evolution of hepatitis. Corticosteroids are not indicated.

Vaccination

Only against hepatitis A and B. Vaccination against hepatitis B is included in the EPI of some countries.

IM vaccination against hepatitis B:

– *Standard schedule*
  • Newborns, infants
    In countries where perinatal infection is common: one injection after birth, then at 6 and 14 weeks
    Where perinatal infection is less common: one injection at 6, 10 and 14 weeks
  • Children, adolescents, adults
    Schedule 0-1-6: 2 injections 4 weeks apart, then a 3rd injection 5 months after the 2nd injection
– *Accelerated schedule*, when rapid protection is required (imminent departure in highly endemic areas, post-exposure prophylaxis)

  Schedule D0-D7-D21: 3 injections administered during the same month, then a 4th injection one year after the 1st injection

Dengue fever

– Dengue fever is an arthropod-borne viral disease transmitted to man through the bite of the *Aedes* mosquito. It develops sporadically and/or as epidemics (southeast Asia, the Pacific, Africa, the Caribbean and South and Central America). Four different serotypes of dengue virus exist.
– Primary infection with the dengue virus may be asymptomatic or may present as *classical dengue fever*. A second infection with a different serotype may provoke *dengue haemorrhagic fever*, characterised by an increased vascular permeability with loss of plasma from the vascular compartment and haemoconcentration.
– Dengue haemorrhagic fever may progress to *dengue shock syndrome* if, at the end of the febrile period, a significant plasma loss is not well compensated.

Clinical signs

– **Dengue fever**
  • fever with headache, retro-orbital pain, muscle and joint pain
  • maculopapular rash on the lower limbs
  • common and benign haemorrhagic signs: skin (petechiae or positive tourniquet test[1]) and more rarely, mucosal (epistaxis, gingival bleeding)
– **Dengue haemorrhagic fever**
  • high fever (39°C-41°C) of sudden onset lasting 2 to 7 days (sometimes with 2 peaks)
  • haemorrhagic signs: skin (petechiae, purpura, ecchymoses, positive tourniquet test[1]); mucous membranes (epistaxis, gingival bleeding); gastrointestinal tract (haematemesis, melaena); bleeding from venepuncture sites
  • hepatomegaly
– **Dengue shock syndrome**
  The critical stage is at the end of the febrile period (from Day 3 to Day 7). The signs preceding shock are: persistent vomiting, intense abdominal pain, agitation or lethargy, sudden hypothermia. Ascites or pleural effusion are possible.
  Signs of shock:
  • rapid and weak, then undetectable pulse
  • cold extremities, profuse sweating
  • narrow pulse pressure, hypotension

Grading severity of dengue haemorrhagic fever (from WHO)

Grade	Clinical signs
I	Fever + non-specific general symptoms + haemorrhagic signs (positive tourniquet test[1] and/or easy bruising)
II	Grade I manifestations + spontaneous bleeding (skin or other haemorrhages)
III	Circulatory failure
IV	Profound shock with undetectable pulse and blood pressure

[1] Tourniquet test: inflate a blood pressure cuff on the upper arm to a point midway between the systolic and diastolic pressure for 5 minutes. The test is considered positive when 20 or more petechiae per 2.5 cm square are observed.

Laboratory

– Complete blood count (CBC) and differentials with platelet count: leukopenia and thrombocytopenia are common with ≤ 100 000 platelets/mm^3.

– Haematocrit is the only test that shows haemoconcentration and therefore differentiates dengue fever from dengue haemorrhagic fever (haematocrit elevated 20% above average for the age and sex: e.g. if the average haematocrit for the relevant population is 35%, a haematocrit of 42% corresponds to an increase of 20%).

– Confirmation of the diagnosis:
Confirm the aetiology at the beginning of an epidemic with serology (ELISA or rapid tests): elevated IgG and IgM anti-dengue antibodies confirm a recent infection.
The IgM/IgG ratio differentiates primary infection (high ratio) from a secondary infection (low ratio), and therefore risk of shock.
An increase in antibodies between two samples (from the beginning and end of an episode) confirms an acute infection. The serotype is identified by serology or PCR.

Treatment

– **Dengue fever**
  • Give **paracetamol** PO (see *Fever*, page 26); wrap the patient in a wet cloth. Acetylsalicylic acid (aspirin) is strictly contra-indicated.
  • Prevent or treat moderate dehydration (plenty of fluids, oral rehydration salts, follow *Treatment plans A or B to treat dehydration*, WHO, annexes 2a, 2b, 2c, pages 331 to 335).

– **Dengue haemorrhagic fever** (*Grades I and II*)
  • Hospitalise and observe children under 15 years, patients presenting with significant or repeated haemorrhages, patients with less than 20 000 platelets/mm^3 and all patients having difficulty eating or drinking.
  • Monitor vital signs (pulse, blood pressure, respiratory rate and urine output) every 3 hours and haematocrit every 6 hours. Look for the signs that precede shock.
  • Administer **Ringer Lactate**: 7 ml/kg/hour for 6 hours then adapt according to the clinical evolution and haematocrit.
  If there is an improvement: progressively reduce the rate to 5 ml/kg/hour then 3 ml/kg/hour and stop the infusion after 24 to 48 hours.
  If there is no improvement: increase to 10 ml/kg/hour, then 15 ml/kg/hour.
  Place the patient under a mosquito net.
  IM injections are contra-indicated.

– **Dengue shock syndrome: emergency** +++ (*Grades III and IV*)
  • Administer **Ringer Lactate**: 10 to 20 ml/kg in less than 20 minutes, to be repeated if necessary, until a cumulative volume of 30 ml/kg is reached.

  If vital signs and haematocrit improve: change to 10 ml/kg/hour and then adapt accordingly.

  If there are no signs of improvement: administer oxygen and immediately check haematocrit:
  – if the haematocrit is still elevated or has risen: **plasma substitute** 10 to 20 ml/kg infused in less than 10 minutes. Repeat if necessary, until a cumulative volume of 30 ml/kg is reached, then give 10 to 20 ml/kg/hour until improvement in the vital signs is seen.

  - a sudden drop in haematocrit without clinical improvement is a sign of haemorrhage (often gastrointestinal or internal): transfuse fresh blood, 10 to 20 ml/kg (ensure screening for HIV, hepatitis B and C etc.).

- Continue to monitor vital signs every 15 to 30 minutes and check haematocrit every 2 hours for the first 6 hours then every 4 hours. Monitor closely for the following 48 hours as shock may recur.
- Stop the infusions once the vital signs are normal and stable, the patient has regained appetite and the haematocrit is normalised, usually 48 hours after shock.

Warning: monitor for fluid overload. Puffy eyelids are the first sign of fluid overload. Stop the infusion until the puffiness disappears. In the event of pulmonary oedema (laryngeal crackles, dyspnoea, increased respiratory rate, cough with or without frothy expectorant, anxiety, crepitations in both lung fields or tachycardia), give:
furosemide IV, to be repeated after 1 to 2 hours if necessary:
Children: 1 mg/kg/injection
Adults: 40 mg/injection

- In an infant with a febrile seizure: see *Seizures*, page 23.

Prevention

- In endemic areas an epidemic risk exists: report probable or confirmed cases.
- Individual protection: mosquito nets and repellents.
- Vector control is essential, particularly during epidemics: destruction of larval habitats, insecticide spraying.

Viral haemorragic fever

– A dozen diseases with different aetiologies and different modes of transmission are grouped under this name as they present with similar clinical signs.
– Dengue haemorrhagic fever is a viral haemorrhagic fever that is described on pages 190-192.

Clinical signs

– Common syndrome (CS):
  • fever higher than 38.5°C
  • short remission on Day 3 or Day 4
  • haemorrhagic symptoms (purpura, epistaxis, haematemesis, melaena etc.)
– The clinical signs are often non-specific, the severity varies depending on the aetiology (see table, page 195).

Laboratory

– Send a sample of whole blood to a reference laboratory (eg. the Pasteur Institute) for serological diagnosis. Attach a clinical description of the patient.
– Wear protective clothing while taking or handling the sample (gloves, protective glasses etc.).
– Use a triple packaging system for shipment. The tube containing the blood specimen is placed in a primary watertight, rigid container enclosing absorbent material between it and the tube containing the blood specimen (1). There must be enough absorbent material to soak up the entire blood sample in the event of a leak. This primary container is then placed in a second rigid container appropriately sealed for transport of infectious materials (2). This second container is placed in a secure carton box that has a visible infectious substance (biohazard) label (3).
– The sample may also be sent on filter paper. It is easier to transport, but the small volume of blood only allows a limited number of aetiologies to be tested.

Management

Suspicion of haemorrhagic fever (isolated case of fever with haemorrhagic symptoms in an endemic area):

– Isolation: isolation ward (or failing that screens/partitions); restrict visitors (provide protective clothing: gowns, gloves, masks).
– Universal precautions:
  The general rules of hygiene must always be respected. The majority of intra-hospital infections have occurred due to a lack of respect for these simple rules.
  • wear gloves for taking samples
  • wear gowns during consultations and care
  • wear thick rubber gloves to handle soiled laundry
  • frequent hand washing
  • respect safe injection practices
– In addition to these non-specific measures wear masks and gloves while examining the patient and protective glasses when there is a risk of splashing.

Confirmed cases of Ebola, Marburg, Lassa, Crimean-Congo haemorrhagic fevers or epidemics of unknown origin:

– More specific measures:
  • strict isolation in a reserved area separate from other patient areas, with a changing room at the entrance/exit
  • disinfection (2% active chlorine), and safe disposal of excreta

  - disinfection of contaminated laundry in chlorine solution (0.1% active chlorine)
  - protective clothing for staff: double gloves, mask, cap, protective glasses, double gown, apron, rubber boots
  - entry/exit: clean laundry for staff at entry; disinfection station at the exit. Gowns, boots and rubber gloves are soaked in a chlorine solution (0.1% active chlorine) for 2 hours before cleaning. Containers for the safe disposal of disposable material. Hand washing with soap.
- The caregiver (maximum one per patient), helped and supervised by the medical staff, follows the same protective measures.
- In the event of a death, do not wash the body. If it is imperative for cultural reasons: wear protective clothing, wash the body with chlorinated water (2% active chlorine), and restrict the number of people involved. Bury the body as quickly as possible, using a body bag when feasible.
- Wear protective clothing when handling contaminated material. No contaminated material should leave the isolation area which includes an incinerator, a sharps pit and a biological waste pit.

Confirmed cases of Yellow fever or Rift Valley fever:
- Universal precautions
- Keep the patient under a mosquito net to prevent transmission

For all patients: report to the Ministry of Health of the country

Treatment

- Aetiological treatment: only for Lassa fever and Crimean-Congo fever (ribavirine).
- Symptomatic treatment:
  - fever: paracetamol (see *Fever*, page 26). Acetylsalicylic acid (aspirin) is contra-indicated.
  - pain: mild (paracetamol), moderate (tramadol), severe (sublingual morphine): see *Pain*, page 28.
  - dehydration: follow *Treatment plans A, B or C to treat dehydration*, WHO, annexes 2b, 2c, 2d, pages 332 to 337.
  - haemorrhagic shock: see page 19
  - seizures: see page 23
  - vomiting: **promethazine** PO
    Children over 2 years: 1 mg/kg/day in one to 3 divided doses
    Adults: 20 to 50 mg every 6 to 8 hours
- For Ebola and Marburg haemorrhagic fevers: invasive procedures must be strictly limited. Health care staff are at risk of contamination when inserting and maintaining intravenous lines. An intravenous line must be well secured so that the patient, often confused, cannot pull it out.

Prevention

- Vaccination
  - Yellow fever:
    Mass vaccination campaign during an epidemic
    Children from 6 months and adults: a single dose of 0.5 ml IM (preferred) or deep SC, in the deltoid muscle. In pregnant women, only administer during an epidemic.
    Routine vaccination (EPI)
  - Rift Valley fever (only during an epidemic)
- Vector control programmes for known vectors.
- Hospital hygiene measures are essential in all cases.

	Reservoir/ Vector *Geographical distribution*	Isolation of patients	Clinical signs *(estimated case fatality rate)*
Ebola* **Marburg**	Unknown *Africa*	Strict isolation	CS + sudden onset general malaise, vomiting and diarrhoea *(60-80%)*
Lassa*	Rodents *Central and West Africa*	Strict isolation	CS + facial oedema, purulent pharyngitis, proteinuria on reagent strip *(10-25%)*
Junin and Machupo*	Rodents *South America*	Isolation	CS + vomiting, erythema of the face and, depending on the aetiology: - periorbital oedema, cervical adenopathy, pharyngitis *(15-30%)*
Omsk	Ticks *Europe, Asia*	None	- pharyngitis, reddened conjunctivae *(2-5%)*
Crimean Congo*	Livestock/Ticks *Africa, Asia*	Strict isolation	- oedema of the soft palate, generalised petechial rash *(5-20%)*
FHSR (hantavirus)*	Rodents *Asia and Europe*	None	- proteinuria on reagent strip *(< 1%)*
Kyasanur	Small mammals/Ticks *India*	None	CS + headache, muscle pain, prostration *(2-10%)*
Rift Valley*	Livestock/Mosquitoes *Africa*	None Mosquito nets	Clinical signs: - isolated fever - CS - encephalitis - retinitis and blindness *(30-50%)*
Yellow fever*	Primates/Mosquitoes *Africa, South America*	None Mosquito nets	CS + jaundice, proteinuria on reagent strip, oliguria, headache *(10-30%)*

* VHF with epidemic potential
CS: common syndrome (see page 193)

HIV infection and AIDS

– AIDS (acquired immune deficiency syndrome) is the most severe form of HIV infection (human immunodeficiency virus).
– Two subtypes of HIV have been identified. HIV-1 is more widespread than HIV-2, which is mainly found in West Africa. HIV-2 is less virulent and less transmissible than HIV-1.
– HIV affects the immune system by infecting the CD4 T lymphocytes resulting in a qualitative and quantitative reduction of this sub-group of lymphocytes.

Evolution of the disease

– *Primary infection or acute retroviral syndrome*: 50 to 70% of newly infected individuals develop a mononucleosis-like syndrome during seroconversion (from 15 days to 3 months post exposure).
– *Asymptomatic HIV infection* (after seroconversion): a period of clinical latency, but not viral latency. The time period for progression from HIV infection to the development of severe immune deficiency in western countries is 10 years. This period appears to be shorter in developing countries.
– *Symptomatic HIV infection*: with progressive destruction of the immune system, common and more severe diseases occur more frequently, and with higher mortality in seropositive individuals.
– *AIDS*: this stage corresponds to the development of severe opportunistic infections and neoplasms. From a biological point of view, AIDS is defined as a CD4 count below 200 cells/mm^3. Without treatment the disease progresses rapidly towards death.

Clinical signs of HIV infection and AIDS

The WHO has proposed a clinical classification of HIV infection with 4 stages of severity:

Clinical stage 1

1. Asymptomatic infection
2. Persistent generalised lymphadenopathy (PGL)
3. Acute retroviral infection

Performance scale 1: asymptomatic, normal activity

Clinical stage 2

4. Weight loss, less than 10% of body weight
5. Minor mucocutaneous manifestations (e.g. seborrhoeic dermatitis, prurigo, fungal nail infections, oral ulcerations, angular cheilitis)
6. Herpes zoster within the last 5 years
7. Recurrent upper respiratory tract infections (e.g. bacterial sinusitis)

And/or performance scale 2: symptomatic, activity nearly normal

Clinical stage 3

8. Weight loss, more than 10% of body weight
9. Chronic diarrhoea, lasting more than 1 month

10. Prolonged fever (intermittent or constant), lasting more than 1 month
11. Oral candidiasis
12. Oral hairy leukoplakia
13. Pulmonary tuberculosis (typical or atypical) within the past year
14. Severe bacterial infections (e.g. pneumonia, pyomyositis)
15. Vulvovaginal candidiasis, chronic (lasting more than 1 month) or responding poorly to treatment

And/or performance scale 3: bedridden less than 50% of the day during the last month

Clinical stage 4

16. HIV wasting syndrome
17. *Pneumocystis jiroveci (carinii)* pneumonia
18. Toxoplasmosis of the brain
19. Cryptosporidiosis with diarrhoea lasting more than 1 month
20. Isosporiasis with diarrhoea lasting more than 1 month
21. Extrapulmonary cryptococcosis
22. Cytomegalovirus (CMV) disease of an organ other than liver, spleen or lymph nodes
23. Herpes simplex virus infection, mucocutaneous lasting more than 1 month, or visceral of any duration
24. Progressive multifocal leucoencephalopathy (PML)
25. Any disseminated endemic mycosis (e.g. histoplasmosis, coccidioidomycosis)
26. Candidiasis of the oesophagus, trachea, bronchi or lungs
27. Disseminated atypical mycobacteriosis
28. Non-typhoid Salmonella septicaemia
29. Extrapulmonary tuberculosis
30. Lymphoma
31. Kaposi's sarcoma (KS)
32. HIV encephalopathy

And/or performance scale 4: bedridden more than 50% of the day during the last month

Laboratory

Diagnosis of HIV infection

The diagnosis of HIV infection can only be made with serological testing. Several different tests exist that, depending on the testing objective, are used alone or in combination.

HIV testing strategy depending on the objective of the test and the prevalence of infection in the population (*based on UNAIDS and WHO, 1998*):

Testing objective	Prevalence	Testing strategy
Blood screening (transfusion)	All prevalence rates	1 test (no results provides)
Individual diagnosis		
Clinical signs/symptoms of	> 30 %*	1 test
HIV infection	≤ 30 %	2 tests
Asymptomatic	> 10 %	2 tests
	≤ 10 %	3 tests

* A prevalence greater than 30% may be seen, for example, on a tuberculosis ward of a hospital.

For individual diagnosis:
– Use of a combination of a rapid test followed by an ELISA or a combination of different rapid tests is recommended. In any case, the first test needs to be sensitive and the 2nd and 3rd tests need to be specific.
– Testing is done *voluntarily* with *informed consent*. Testing is never mandatory. Every individual has the right to know (or not to know) his HIV status.
– Test results are *confidential* to avoid discrimination.
– A first positive test must always be followed by a *confirmation test*.
– A first negative test should be repeated 3 months later to exclude seroconversion (window period).
– The individual should have access to *minimum services* offering pre-test and post-test counselling, treatment and support.

CD4 lymphocyte counts

– CD4 cell lymphopenia is a marker of the progression of immunosuppresion. It is a predictor of the development of opportunistic infections or neoplasms and can be used to orient their diagnosis (e.g. cerebral toxoplasmosis or cryptococcal meningitis appear when the CD4 count is below 100 cells/mm^3. If clinical signs indicating these infections are present, but the CD4 count is greater than or equal to 200 cells/mm^3, it is unlikely that these infections are present).
– The CD4 cell count is also used as an indicator for primary prophylaxis (see *primary prophylaxis*, page 200).

Treatment of HIV infection

Antiretroviral treatment (ARV)

A multi-drug antiretroviral regimen (HAART: Highly Active Anti Retroviral Therapy) is the reference treatment. It does not eradicate the virus, but slows the natural progression of the disease and improves the patient's clinical state by reducing the viral load and increasing the CD4 cell count to levels beyond the threshold of opportunistic infections.

Therapeutic classes
Three major classes of ARV exist. The most commonly used antiretrovirals are:
– among the nucleoside reverse transcriptase inhibitors (NRTI): zidovudine (AZT), lamivudine (3TC), didanosine (ddI), stavudine (d4T), abacavir (ABC);
– among the non-nucleoside reverse transcriptase inhibitors (NNRTI): efavirenz, nevirapine (warning, HIV-2 is naturally resistant to NNRTI);
– among the protease inhibitors (PI): indinavir, nelfinavir, ritonavir (used more and more in combination with another PI), saquinavir.

Principles of ARV treatment
– Daily triple therapy must be given for life to prevent the rapid development of resistance. It is important that the patient understands this and that compliance be optimal.
– The most classic and the easiest regimens to administer are 2 NRTI + 1 NNRTI: e.g. zidovudine + lamivudine associated with efavirenz (contra-indicated in pregnant women) or nevirapine.
– In the event of treatment failure, use as a second line: 2 other NRTI + 1 IP.

Other possible combinations exist which are less commonly used or more difficult to manage.

Criteria for ARV treatment
As there are a large number of patients who would benefit from treatment, it seems legitimate to prioritise the treatment of patients already in clinical stage 4 and patients most at risk of developing severe opportunistic infections (patients with a CD4 count below 200 cells/mm^3).

Monitoring of ARV treatment
Treatment requires minimal monitoring which varies depending on the antiretrovirals used, but as a minimum, it must be possible to test for FBC, Hb and ALT. CD4 count and viral load are useful (criteria for initiation of treatment and for change of line), but are not indispensable.

Treatment of opportunistic and other infections

With progressive immunosuppression, HIV infected patients who are not receiving triple therapy (or patients with poor compliance) become increasingly susceptible to infections. In clinical stages 2 and 3, standard treatments are usually effective and the diagnosis of HIV infection does not alter clinical management. From these stages, patients may benefit from primary prophylaxis (see *primary prophylaxis*, page 200). This prophylaxis is however restrictive, and it is recommended that the seropositive status of the patient be confirmed before starting prophylactic treatment.

Severe opportunistic infections often require sophisticated diagnostic and therapeutic means rarely available in developing countries. However, with improving health services, most of these diseases can be treated.

For treatment of opportunistic infections, see tables pages 202 to 208.

Treatment of pain: remember to treat all patients for associated pain (see *Pain,* page 28).

Prevention of HIV infection

– **Sexual transmission**

The only reliable method of prevention is the use of male or female condoms.
In addition, early diagnosis and treatment of sexually transmitted infections is essential as they increase the transmission of HIV (see Chapter 9).

Post-exposure prophylaxis (PEP): e.g. in the event of rape, antiretroviral treatment (usually a combination of zidovudine + lamivudine) begun within 48 hours after possible exposure and given for a duration of 1 month may reduce the risk of transmission.

– **Transmission through blood and blood products**

- transfusion: strict respect of indications for transfusion and systematic serological screening of blood donors are the 2 indispensable precautions in the prevention of HIV transmission through transfusions.
- IV drug use: needle and syringe exchange programmes with disposable needles and syringes for users.
- information about the risks linked to traditional practices (circumcision, scarification, tattoos etc.).

– **Occupational transmission** (accidental needle stick injuries or injuries with contaminated objects, contact between a patient's blood and unprotected broken skin or mucous membranes).
Prevention is based on use of universal precautions to avoid contamination with soiled material or potentially infected body fluids.

Post exposure prophylaxis (PEP): e.g. in the event of an accident, antiretroviral treatment (usually a combination of zidovudine + lamivudine) begun within 48 hours after the accident and given for a duration of 1 month reduces the risk of transmission.

– **Nosocomial transmission**

Prevention of nosocomial HIV infection is based on the rational use of injections and strict respect for hygiene and sterilisation and disinfection procedures for medical material (see page 297).

– **Mother-to-child transmission (MTCT)**

The global rate of vertical transmission varies from 20% to 40%. The risk of transmission through breastfeeding is evaluated at approximately 12% and persists for the duration of breastfeeding.

In pregnant women: HIV transmission from mother-to-child may be reduced by the administration of antiretrovirals. Many different protocols exist of varying complexity, duration and effectiveness. The most commonly used ARV are zidovudine (alone or in combination with lamivudine) and nevirapine. ARV are administered to the mother during pregnancy and labour and, depending on the protocol, the post-partum period. Protocols may also include a treatment for the newborn.
Programmes targeting pregnant women also include other preventive measures:
- condom distribution (the risk of mother-to-child transmission is particularly high when the mother is infected with HIV during pregnancy),
- obstetrical precautions: no systematic episiotomy; avoid artificial rupture of the membranes. Elective caesarean section – before the start of labour – may reduce the risk of transmission. It is only considered if the operation can take place in good conditions. It is important to consider the obstetrical risks for the patient, including risks for future pregnancies (uterine scarring).

In breastfeeding women: promote artificial breast milk if the supply of milk and safe water is guaranteed. If not, continue exclusive maternal breastfeeding until the age of six months followed by rapid weaning. Mixed breastfeeding (maternal + artificial milk) appears to be contra-indicated.

– HIV is not transmitted by saliva, mosquitoes, air, water, food, skin contact, clothes, cooking utensils etc.

Prevention of opportunistic infections

In the absence of ARV treatment, all HIV infections become symptomatic and evolve towards AIDS. However, some opportunistic infections can be prevented.

Primary prophylaxis

For HIV infected patients who have not previously contracted an opportunistic infection, in order to prevent the development of some opportunistic infections.

Criteria for primary prophylaxis:
– In the absence of a CD4 count: patients in WHO clinical stages 2, 3 and 4.
– When testing is possible: total lymphocyte count below 1000 cells/mm^3; CD4 count below 200 cells/mm^3, irrespective of the clinical stage.[1]

[1] In developing countries, the WHO recommends primary prophylaxis for symptomatic patients with a total lymphocyte count < 2000 cells/mm^3 or CD4 < 500 cells/mm^3.

Infections	Primary prophylaxis	Comments
Pneumocystosis Cerebral toxoplasmosis Isosporiasis Various bacterial infections	**cotrimoxazole** PO: Children: 50 mg SMX + 10 mg TMP/kg once daily Adults: 800 mg SMX + 160 mg TMP once daily	Lower doses of cotrimoxazole are sufficient for PCP and isosporiasis but to widen the preventive spectrum (particularly for toxoplasmosis), use the dosages indicated.
Tuberculoseis Only if the patient has: - direct contact with an AFB+ patient ou - positive tuberculin test and active tuberculosis is excluded	**isoniazide** PO: Children: 5 mg/kg once daily without exceeding 300 mg/day Adults: 300 mg once daily + **pyridoxine** PO: 100 mg 2 times weekly for 9 months	Contra-indicated in patients with active tuberculosis

Secondary prophylaxis

For patients who develop a specific opportunistic infection, in order to prevent recurrence once treatment for the infection is completed.

Infections	Secondary prophylaxis	Comments
Pneumocystosis	**cotrimoxazole** PO: Children: 50 mg SMX + 10 mg TMP/kg once daily Adults: 800 mg SMX + 160 mg TMP once daily Lower doses of cotrimoxazole are sufficient for PCP and isosporiasis but to widen the preventive spectrum (particularly for toxoplasmosis), use the dosages indicated.	Alternative: **dapsone** PO Children: 2 mg/kg once daily without exceeding 100 mg/day Adults: 100 mg once daily
Toxoplasmosis		Alternatives: Adults: **sulfadiazine** PO: 2 g daily + **pyrimethamine** PO: 25 mg daily + **folinic acid** PO: 30 mg weekly or **dapsone** PO: 200 mg weekly or 50 mg daily + **pyrimethamine** PO: 75 mg weekly + **folinic acid** PO: 30 mg weekly
Isosporiasis		
Penicilliosis	**itraconazole** PO: Adults: 200 mg once daily	
Histoplasmosis	**itraconazole** PO : Adults: 200 mg once daily	
Cryptococcal meningitis	**fluconazole** PO: Children: 3 to 4 mg/kg once daily Adults: 200 mg once daily	
Oral or oesophageal candidiasis	**fluconazole** PO: Children: 3 to 4 mg/kg once daily Adults: 100 to 200 mg once daily	Only for frequent and severe recurrences
Herpes simplex	**aciclovir** PO: Children under 2 years: 400 mg/day in 2 divided doses Children over 2 years and adults: 800 mg/day in 2 divided doses	Only for frequent and severe recurrences

Symptoms	Definitions and aetiologies	Diagnosis	Treatment
Diarrhoea with or without blood (also see chapte 3)	Diarrhoea is defined as at least 3 liquid stools per day. Diarrhoea is considered chronic if it is constant or intermittent for more than 1 month in symptomatic HIV-infected patients. Aetiologies **Parasitic infections**: • *Cryptosporidium* • *Microsporidium* • *Isospora belli* • *Giardia lamblia* • *Entamoeba histolytica* **Bacterial infections**: • *Shigella* • *Salmonella* • *Campylobacter* • *Clostridium difficile* (toxin) **Mycobacterial infections**: *Mycobacterium avium* complex (MAC) **Helminthiasis**: *Strongyloides stercoralis* **Viral infections**: Cytomegalovirus (CMV) **Non-infectious causes**: • Kaposi's sarcoma • Lymphoma • Cytotoxic effect of HIV • Some antiretrovirals	1. History and clinical examination 2. Microscopic examination of stool (at least 3 samples) *Note*: *Cryptosporidium*, *Microsporidium*, *Isopora belli*, MAC and CMV are unlikely in patients with CD4 count > 200 cells/mm^3	- Prevention and treatment of dehydration (see WHO protocol, pages 331-337). - Depending on the results of the stool examinations: give appropriate treatment - If there is no laboratory or if the results are negative: ***A. Bloody diarrhoea, observed or on history*** • First-line treatment: **cotrimoxazole** PO for 5 days Children: 50 mg SMX + 10 mg TMP/kg/day in 2 divided doses Adults: 1600 mg SMX + 320 mg TMP/day in 2 divided doses or **metronidazole** PO for 5 to 7 days if amoebiasis is suspected (for 7 to 10 days if *C. difficile* is suspected) Children: 30 mg/kg/day in 3 divided doses; Adults: 1.5 g/day in 3 divided doses • If there is no improvement, give as second-line treatment: **ciprofloxacin** PO for 5 days if shigellosis is suspected (for 14 days if salmonellosis is suspected) Children: 20 to 30 mg/kg/day in 2 divided doses Adults: 1 to 1.5 g/day in 2 divided doses or **erythromycin** PO for 5 days Children: 50 mg/kg/day in 2 divided doses; Adults: 2 g/day in 2 divided doses ***B. Non-bloody diarrhoea*** (no blood seen on visual inspection) • If helminthiasis is suspected: **albendazole** PO Children over 2 years and adults: 400 mg once daily for 3 days • If helminthiasis is not suspected, first-line: **cotrimoxazole** for 5 days and/or **metronidazole** PO for 10 days (active against *C. difficile*) • For treatment failure: **erythromycin** PO (active against *Campylobacter*) for 5 days Children: 50 mg/kg/day in 2 divided doses; Adults: 2 g/day in 2 divided doses • If no improvement: **cotrimoxazole** PO at high doses (treatment for *I. belli*) Children: 100 mg SMX + 20 mg TMP/kg/day in 2 divided doses for 10 days followed by 50 mg SMX + 10 mg TMP/kg/day in 2 divided doses for 3 weeks Adults: 3200 mg SMX + 640 mg TMP/day in 2 divided doses for 10 days days followed by 1600 mg SMX + 320 mg TMP/day in 2 divided doses for 3 weeks *A secondary prophylaxis is recommended.* • **albendazole** 800 mg/day in 2 divided doses for 2 to 4 weeks may be effective in treating *Microsporidium* - If no improvement (and no contra-indications such as bloody diarrhoea), symptomatic treatment with **loperamide** PO: Children under 2 years: contra-indicated; children from 13 to 20 kg: 3 mg/day Children from 20 to 30 kg: 4 mg/day; children over 30 kg: 6 to 8 mg/day Adults: initial dose of 4 mg then 2 mg after each liquid stool (maximum 16 mg/day) - In the event of relapse within 4 weeks after improvement, restart antibiotic or antiprotozoal treatment for 6 to 12 weeks.

Symptoms	Definitions and aetiologies	Diagnosis	Treatment
Diarrhoea with or without blood (continued)			**Nutrition** ++++ Children: continue to breastfeed; increase the calorie and protein intake. Eliminate milk of animal origin, give porridge prepared with rice water or soup or yoghurts. Give 2.5 ml of oil/meal. Adults: increase the calorie and protein intake. No food is excluded but avoid fatty food, raw food, milk and foods high in fibre. Encourage small, frequent meals.
Oral and oesophageal lesions	**Fungal infections**: • Oral candidiasis: whitish plaques on the oral mucosa, difficult to detatch. If detatched: granulous and bloody base. • Oesophageal candidiasis: pain on swallowing, dysphagia. May result in weight loss. **Viral infections**: • Oral hairy leukoplakia (keratosis on the lateral sides of the tongue due to the Epstein-Barr virus) • Oral and oesophageal herpes **Aphthous ulcers**	Clinical examination is usually enough to make a diagnosis. If in doubt: microscopic examination of an oral sample. Consider all severe oral candidiasis (if the pharynx is involved) as oesophageal candidiasis even in the absence of dysphagia.	- Oral candidiasis: **miconazole** gum patch: apply one patch/day to the gums for 7 days or **clotrimazole** PO: 30 mg/day in 3 divided doses for 7 days; tablets to be sucked or **nystatin** PO 100 000 IU lozenges: 1 lozenge 4 times/day for 10 days; to be sucked *Note: oral candidiasis is an indication for PCP prophylaxis* - Oesophageal candidiasis: **nystatin** PO for 20 days (see *Stomatitis*, Chapter 3) or preferably, **fluconazole** PO: Children: 3 to 6 mg/kg once daily for 14 days Adults: 200 mg the first day then 100 mg once daily for 14 days (or if necessary, 200 mg once daily for 14 days according to the clinical response) - Oral hairy leukoplakia: no treatment - Oral herpes: Local treatment and analgesics, see *Stomatitis*, Chapter 3 For recurrent or extensive forms affecting the oesophagus, add: **aciclovir** PO within the 48 hours following the onset of lesions: Children under 2 years: 200 mg 5 times/day for 7 days Children over 2 years and adults: 400 mg 5 times/day for 7 days *Secondary prophylaxis only for patients with frequent recurrences*

Symptoms	Definitions and aetiologies	Diagnosis	Treatment
Respiratory problems (also see chapter 2)	Cough and/or thoracic pain and/or dyspnoea in a symptomatic HIV infected patient. Aetiologies: **Bacterial infections**: Pyogenic bacteria (*Streptococcus pneumoniae*, *Haemophilus influenzae*, *Staphylococcus aureus*) **Mycobacterial infections**: *M. tuberculosis*, *MAC* **Protozoal infections**: *Pneumocystis jiroveci* **Fungal infections**: *Cryptococcus neoformans*, *Histoplasma capsulatum*, *Coccidioides immitis*, *Aspergillus spp*, *Penicillium marneffei* **Viral infections**: CMV **Neoplasms**: • Kaposi's sarcoma • Non-Hodgkin's lymphoma **Others**: • Lymphoid interstitial pneumonia • Pleural effusion (often TB) • Pericardial effusion (often TB) • Pneumothorax (may be due to PCP)	1. History and clinical examination: Blood in the sputum? If fever < 7 days, dyspnoea: unlikely TB. If cough > 21 days, weight loss, thoracic pain > 15 days, no dyspnoea: likely TB. Pulmonary auscultation: bilateral lobar pneumonia? 2. If possible: a) Look for AFB in sputum (3 samples) b) Chest x-ray • Pneumocystis: bilateral interstitial infiltrates • Tuberculosis: lobar consolidation, cavitation, pleural effusion, intra-thoracic lymphadenopathy *Warning*: the classic radiological signs of tuberculosis are not always found in HIV + tuberculosis patients. *Notes*: • MAC, pneumocystis, CMV and fungal infections are unlikely in patients with a CD4 count > 200 cells/mm^3 • Staphylococcal pneumonia is often associated with a pyomyositis or an abscess	• For the diagnosis and treatment of upper respiratory tract infections, particularly pneumonia: see Chapter 2 • If the chest x-ray is consistent with staphylococcal pneumonia: Children: see *Staphylococcal pneumonia*, Chapter 2 Adults: **cloxacillin** PO, 2 g/day in 2 divided doses for 10 days • If the sputum examination is AFB+, treat for tuberculosis (no thioacetazone: risk of severe reactions in HIV infected patients) • If the sputum examination is negative and the chest x-ray is consistent with a pyogenic infection in a patient who has not responded to standard treatment: **amoxicillin** + **clavulanic acid** PO (dosages expressed in amoxicillin) Adults: 1.5 g/day in 3 divided doses for 10 to 14 days • Suspect AFB– tuberculosis if the patient does not respond to amoxicillin + clavulanic acid • If the sputum examination is negative and the chest x-ray is consistent with *Pneumocystis jiroveci* pneumonia: **cotrimoxazole** PO for 21 days Children: 100 mg SMX + 20 mg TMP/kg/day in 2 divided doses Adults: 1600 mg SMX + 320 mg TMP, 3 or 4 times daily *Note*: the symptoms may become worse during the first phase of treatment, effectiveness can only be evaluated after one week of treatment. In cotrimoxazole-allergic patients: Adults: **clindamycin** PO or IV: 2.4 g/day in 4 doses or injections + **primaquine** PO: 15 mg once daily for 21 days For either treatment, add **prednisolone** PO for patients with severe pneumocystosis with hypoxia: Children: start with 2 mg/kg/day then decrease the dose following the adult example Adults: 80 mg/day in 2 divided doses for 5 days, then 40 mg/day for 5 days then 20 mg/day for 10 days *Secondary prophylaxis for life is recommended.* • Fungal infections (cryptococcosis, penicilliosis, histoplasmosis): Adults: **amphotericin B** IV: 0.5 to 1 mg/kg/day administered over 4 to 6 hours for 2 weeks (cryptococcosis, penicilliosis) or 3 to 10 days (histoplasmosis), followed by: **fluconazole** PO: 400 mg once daily for 8 weeks for cryptococcosis **itraconazole** PO: 400 mg/day in 2 divided doses for 10 weeks for penicilliosis **itraconazole** PO: 600 mg/day in 2 divided doses for 3 days then 400 mg/day for 12 weeks for histoplasmosis *Secondary prophylaxis for life is recommended.*

Symptoms	Definitions and aetiologies	Diagnosis	Treatment
Lymphadenopathy	Enlarged lymph nodes in a symptomatic HIV infected patient Persistent generalised lymphadenopathy (PGL): • 2 or more extra-inguinal sites • lymph nodes > 1.5 cm • enlarged for 3 or more months PGL is usually due to HIV infection. Aetiologies: **HIV infection** **Infections**: • Tuberculosis • Syphilis • Histoplasmosis • Toxoplasmosis • CMV **Neoplasms**: • Kaposi's sarcoma • Lymphoma	1. Clinical examination: look for a local cause (skin or dental infection etc.); TB or syphilis. 2. Suspected TB: lymph node aspiration, look for AFB, chest x-ray *Note*: in HIV infected patients, tuberculosis is often extra-pulmonary. 3. Suspected syphilis: serology, direct microscopy 4. If all examinations are negative: biopsy is useful to exclude lymphoma, Kaposi's sarcoma and fungal or mycobacterial infections (see notes for patients in Stage 1).	- Treat according to the aetiology or empirical treatment with, for example **cloxacillin** or **doxycycline** PO. - Tuberculosis: treat according to the national protocol. - Early syphilis: **benzathine benzylpenicillin** IM Adults: 2.4 MIU as a single dose (1.2 MIU in each buttock) *Note*: in patients in **Stage 1**, no further investigation (other than 1, 2 and 3 in this table) or treatment are required.

Symptoms	Definitions and aetiologies	Diagnosis	Treatment
Headache and neurological disorders in adults	Persistent headache that does not respond to usual analgesics in a symptomatic HIV infected patient. Aetiologies: **Infections**: • Tuberculous meningitis • Cryptococcal meningitis • Cerebral toxoplasmosis • Neurosyphilis • CMV encephalitis • HIV encephalopathy • Progressive multifocal leuko-encephalopathy • Cerebral malaria **Neoplasms**: Primary CNS lymphoma **Common causes of headache unrelated to HIV infection**: sinusitis, problems with accommodation etc. (sometimes more frequent in HIV infected patients) **Undesirable effects of medication**: Some antiretrovirals	History and clinical examination: • Change in mental state • Focal deficits • Seizures • Signs of meningeal irritation • Raised intercranial pressure • Motor problems, ataxia In endemic areas: check for malaria (if febrile): thick and thin films. Lumbar puncture (LP) if not contra-indicated. Elements favouring neurosyphilis: • VDRL positive in blood and/or CSF • cells in the CSF • high protein in the CSF	Positive thick and thin films: see *Malaria*, Chapter 6. For patients with focal signs, treat for toxoplasmosis for 6 weeks: **pyrimethamine** PO: 200 mg in 2 divided doses on the 1st day, then 75 to 100 mg/day + **sulfadiazine** PO: 4 to 6 g/day + **folinic acid** PO: 15 mg/day or, failing that, **cotrimoxazole** PO at high doses: 50 mg SMX + 10 mg TMP/kg/day in 2 divided doses for 4 weeks *A secondary prophylaxis for life is recommended.* Positive lumbar puncture: • Bacterial meningitis: see Chapter 7 • Tuberculous meningitis: treat according to the national protocol • Cryptococcal meningitis: **amphotericin B** IV 0.5 to 1 mg/kg/day for 2 weeks followed by **fluconazole** PO 400 mg once daily for 8 weeks *A secondary prophylaxis for life is recommended.* *Note*: intracranial pressure (ICP) is often raised in cryptococcal meningitis. To lower ICP, repeated punctures to drain CSF may be necessary at the beginning of treatment. Neurosyphilis: **benzylpenicilin** IV: 12 to 24 MIU/day in 6 injections at 4 hour intervals for 14 days or **benzylpenicillin procaine** IM: 1.2 g once daily + **probenecid** PO: 2 g/day in 4 divided doses for 10 to 14 days Headache of no known origin: symptomatic treatment starting with a step 1 analgesic (see *Pain*, chapter 1).

Symptoms	Definitions and aetiologies	Diagnosis	Treatment
Neurological disorders in children	Aetiologies: • Bacterial meningitis • Tuberculous meningitis • Cryptococcal meningitis • Cerebral toxoplasmosis • CMV meningo-encephalitis • Cerebral malaria	Good history taking as only patients with acute episodes benefit from specific aetiological treatment (seizures, meningeal syndrome, focal signs). In endemic areas, check for malaria (if febrile): thick and thin films. Lumbar puncture (LP) if not contra-indicated.	Positive thick and thin films: see *Malaria*, Chapter 6. If LP is not possible: • Treat for bacterial meningitis if patient febrile and/or meningeal syndrome (see Chapter 7). • Treat for toxoplasmosis if focal signs present: **pyrimethamine** PO: 2 mg/kg/day in 2 divided doses for 2 days then 1 mg/kg/day + **sulfadiazine** PO: 80 mg/kg/d in 2 divided doses + **folinic acid** PO: 10 mg once daily for 8 weeks or, failing that, **cotrimoxazole** PO at high doses: 100 mg SMX + 20 mg TMP/kg/day in 2 divided doses for 4 weeks *A secondary prophylaxis for life is recommended.* If the LP is positive: • Bacterial meningitis: see Chapter 7 • Tuberculous meningitis: treat according to the national protocol • Cryptococcal meningitis: **amphotericin B** by very slow IV infusion over 6 hours: 0.7 mg/kg/day for 2 weeks followed by **fluconazole** PO: 6 to 8 mg/kg once daily for 8 weeks *A secondary prophylaxis for life is recommended.*
Persistent or recurrent fever	Temperature higher than 38°C, chronic (lasting more than 5 days) or recurrent (multiple episodes in a period of more than 5 days) Aetiologies : **Infections**: • Common childhood diseases • Severe bacterial infections (TB, pneumonia, typhoid fever, septicaemia, meningitis, endocarditis etc.) • Occult bacterial infections (sinusitis, otitis, urinary tract infections) • Opportunistic infections (TB, mycosis, toxoplasmosis) • Malaria **Neoplasms**: Non-Hodgkin's lymphoma **HIV infection** **Fever caused by medication**	1. History and clinical examination: look for a ENT or urinary infection, TB, skin infection, enlarged lymph nodes etc. 2. In endemic areas, check for malaria: thick and thin films. 3. Suspected TB: look for AFB. 4. Chest x-ray, CBC, blood cultures, urinalysis, stool culture, serology, lumbar puncture (LP). If the patient is under treatment, think of a fever caused by secondary effects of medication.	Positive thick and thin films: see *Malaria*, Chapter 6. If testing is not available: in endemic zones, give systematic malaria treatment. Suspected meningitis: treat according to the results of the LP. If LP is not available, treat for bacterial meningitis, see Chapter 7. Identified or suspected focus of infection: ENT: see Chapter 2; urinary: see Chapter 9 etc. Tuberculosis: treat according to the national protocol.

Symptoms	Definitions and aetiologies	Treatment
Skin lesions (see also Chapter 4)	**Bacterial infections**: • Furunculosis • Impetigo and pyoderma • Axillary hidradenitis • Pyomyositis • Bacillary angiomatosis • Syphilis	**Bacterial infections**: • Furunculosis, impetigo, chronic folliculitis: local treatment, +/- **cloxacillin** PO: see *Bacterial skin infections*, Chapter 4. • Suppurative axillary hidradenitis: local treatment + **doxycycline** PO: 200 mg/day in 1 or 2 divided doses for 6 weeks (in adults) • Pyomyositis: antibiotics/surgical drainage, see *Pyomyositis*, Chapter 10. • Bacillary angiomatosis: Adults: **erythromycin** PO 2 g/day in 2 or 3 divided doses for 2 months or **doxycycline** PO 200 mg/day in 2 divided doses for 2 months • Primary and secondary syphilis: see *Sexually transmitted infections*, Chapter 9.
	Viral infections: • Herpes zoster • Herpes simplex • Genital warts • *Molluscum contagiosum*	**Viral infections**: • Herpes zoster: local treatment and analgesics, see *Herpes simplex and herpes zoster*, Chapter 4 For necrotic, extensive forms, eruption on the face, ophthalmic zoster, add **aciclovir** within 48 hours of the onset of lesions: Children (IV route): 15 to 30 mg/kg/day in 3 infusions (every 8 hours) for 7 days Adults (oral route): 800 mg 5 times daily for 7 days • Herpes simplex: local treatment, see *Herpes simplex and herpes zoster*, Chapter 4. • Genital warts: see *Sexually transmitted infections*, Chapter 9.
	Fungal infections: Candidiasis, dermatophytoses and deep mycoses (penicilliosis, cryptococcosis, histoplasmosis etc.)	**Fungal infections**: • Candidiasis: **gentian violet** or **nystatin** ointment, twice daily • Dermatophytoses: see *Superficial fungal infections*, Chapter 4.
	Neoplasms: Kaposi's sarcoma	
	Other skin infections: • Chronic prurigo or urticaria • Severe seborrhoeic dermatitis • Psoriasis • Scabies • Diffuse cutaneous xerosis **Rash caused by medication** **Bed sores**	**Other skin infections**: • Prurigo, urticaria: see *Other skin disorders*, Chapter 4. • Seborrhoeic dermatitis: **gentian violet** or **Whitfield's ointment** or **ketoconazole** or 2% **miconazole** applied twice daily. For severe inflammation, use a topical corticosteroid in combination with either miconazole or ketoconazole. • Xerosis: **zinc oxide** ointment or **calamine** lotion • Psoriasis: **corticosteroides** and **zinc oxide** ointment • Scabies: local treatment. For crusted or profuse scabies, add **ivermectin** PO (see *Scabies*, Chapter 4).

CHAPTER 9

Genito-urinary diseases

Acute glomerulonephritis

– Inflammation of the renal glomeruli, of immunologic origin, most commonly occurring several weeks after a streptococcal infection (tonsillitis, skin infections or other infectious focus). Acute glomerulonephritis is most common in children over 3 years of age and young adults.
– The significant sodium and fluid retention caused by glomerulonephritis can be life threatening (acute pulmonary oedema or cerebral oedema), but outcomes are usually favourable with clinical signs disappearing after a few days. Proteinuria usually resolves after several weeks and macroscopic haematuria disappears after several months.

Clinical signs

– Fluid retention of varying severity: mild oedema limited to the eyelids; or soft and painless pitting oedema of the lower limbs; or severe oedema (acute pulmonary oedema or cerebral oedema with seizures that may reveal the disease).
– Hypertension
– Macroscopic haematuria
– Oliguria with concentrated urine
– Urinalysis: often significant proteinuria

Treatment

– Bed rest, but not systematically
– Strict salt and fluid restriction
– For patients with severe oedema only:
furosemide PO
Children: 1 to 2 mg/kg/day in 1 or 2 divided doses
Adults: 40 to 60 mg/day in 1 or 2 divided doses
– Treatment of the complications of fluid retention:
  • Hypertension (see page 281)
  • Acute pulmonary oedema (see page 284)
  • Seizures (see page 23)
– Treat the infectious focus if still present during the episode of acute glomerulonephritis.

Nephrotic syndrome

– The definition is biological:
  • proteinuria greater than 50 mg/kg/24 hours in children and 3 g/24 hours in adults
  • hypoalbuminemia less than 30 g/litre
  • hypoprotidemia less than 60 g/litre

– Clinically, oedema and oliguria are often, but not always associated.

Two syndromes are identified:

– **Idiopathic nephrotic syndrome**
  • Due to a primary renal disease, which may or may not be sensitive to corticosteroids, rare in tropical countries. The prognosis is variable according to the treatment response.
  • Hypertension, haematuria and renal impairment are absent.

– **Associated nephrotic syndrome**
  • Due to a primary renal or a systemic disease (diabetes, infection, parasitosis, collagenosis), usually not responsive to corticosteroids, the most common form in tropical countries. The prognosis is poor.
  • It is associated with hypertension, micro or macroscopic haematuria and renal impairment.

Treatment

Idiopathic nephrotic syndrome

– Corticosteroid therapy: **prednisolone** PO

Children: 2 mg/kg/day in 2 divided doses for 4 weeks, without exceeding 60 mg/day, followed by 2 mg/kg on alternate days, in the morning, for 8 weeks. Then progressively decrease the dose over a period of 6 weeks (reduce by 0.5 mg/kg every 15 days), for a total treatment period of 4 to 5 months.

Adults: the same treatment as for children with an initial dose of prednisolone of 1 mg/kg once daily in the morning.

Notes:
- Response to treatment is usually obtained in 10 to 15 days.
- Relapse is most commonly due to over-rapid reduction of the corticosteroids.
- **Relapse** during the reduction of the corticosteroids is a sign of corticosteroid-dependence and justifies a longer corticosteroid therapy. Longer treatment complicates monitoring and increases the risk of adverse effects. As a result, it may be necessary to treat patients with idiopathic nephrotic syndrome as nephrotic syndrome due to a systemic disease.
- A **total lack of response** after 4 weeks of correct corticosteroid therapy is a sign of corticosteroid-resistance and treatment should be stopped. Treat as a nephrotic syndrome due to a systemic disease.
- Adult response to corticosteroids is slower than for children, but in adults, there is less chance of relapse.

– Complementary treatment:
  • Salt and fluid restriction.
  • High calorie, high protein diet.
  • Avoid immobilisation in bed: risk of thrombo-embolitic complications.
  • Very cautious use of diuretics for significant oedema that is resistant to fluid and salt restriction (see below).
  • Early diagnosis and treatment of associated complications or infections.
  • In case of hypovolaemia, see below.

Treatment of nephrotic syndrome due to a systemic disease

– Diuretics only for patients with significant oedema: use cautiously to prevent dehydration or haemoconcentration, which are risk factors for thrombo-embolitic complications.

  Children:
  furosemide PO: initial dose of 1 mg/kg once daily
  combined with **spironolactone** PO: initial dose of 2 to 3 mg/kg/day in 2 divided doses then reduce the dose progressively and adapt according to the clinical evolution while avoiding a rebound-effect.

  Adults:
  furosemide PO: initial dose of 20 to 40 mg once daily
  combined with **spironolactone** PO: initial dose of 50 to 100 mg/day in 2 divided doses then progressively reduce the dose and adapt according to the clinical evolution while avoiding a rebound-effect.

– For hypovolaemia:

  Children:
  plasma substitute (polygeline or modified fluid gelatin): 20 ml/kg over 2 to 3 hours followed by **furosemide** direct IV: 1 mg/kg, to be repeated once (at least 2 hours after the first injection) depending on the blood pressure.

  Adults:
  plasma substitute (polygeline or modified fluid gelatin): one 500 ml bottle followed by **furosemide** direct IV: 20 to 40 mg, to be repeated once (at least 2 hours after the first injection) depending on the blood pressure.

– Complementary treatment:
  • Salt and fluid restriction.
  • High calorie, high protein diet.
  • Avoid immobilisation in bed: risk of thrombo-embolitic complications.
  • Early diagnosis and treatment of associated complications or infections.
  • Treatment of the associated primary disease if known.

Urolithiasis

Partial or complete obstruction of the urinary tract by one or more calculi.

Clinical signs

– Acute, sometimes intense, flank or pelvic pain (renal colic).
– Haematuria, may be accompanied by the passage of a calculus.
– Urinalysis: haematuria, leucocyturia may be present.
– Secondary infections may develop: cystitis (see page 215) or pyelonephritis (see page 216).

Treatment

– Increase fluid intake: 3 to 4 litres/day
– Analgesics:
  • For moderate pain:
    diclofenac PO: 150 mg/day in 3 divided doses for 3 days
    + **hyoscine butylbromide** PO: 30 to 60 mg/day in 3 divided doses for 3 days
  • For renal colic:
    diclofenac IM: 75 mg/injection, 1 or 2 times/day for a maximum of 2 days then change to oral treatment
    + **hyoscine butylbromide** IM: 10 to 20 mg/injection to be repeated every 8 hours according to the clinical evolution
– In patients with infection: antibiotic treatment as for pyelonephritis (see page 216). The effectiveness will depend on the passage of the calculus.

Acute cystitis

Infection of the bladder and urethra, usually due to *Escherichia coli*.

Clinical signs

– Burning sensation on urination, urinary frequency, cloudy urine, sometimes haematuria, absence of fever. The symptom 'burning pain on urination' alone is insufficient to make the diagnosis.
– In non-pregnant women, cystitis is considered *uncomplicated* when it is recent, isolated, non recurrent, in a patient without history of uropathy nor severe underlying disease.
– In men, cystitis is always considered *complicated* as it is associated with an urinary tract abnormality or an infection of the urethra, prostate or epididymis.
– If the patient presents with signs of an upper urinary tract infection (fever and unilateral flank pain), see *Acute pyelonephritis*, page 216.

Laboratory

– Urine dipstick:
  • the presence of infection is excluded if the results of both leukocyte-esterase and nitrites are negative,
  • the presence of leukocytes (which indicates an inflammation) and/or nitrites (which indicates the presence of enterobacteria) confirms the clinical suspicion of urinary tract infection.
– In pregnant women, a dipstick test for bacteriuria should be systematically performed at each antenatal visit. All women, symptomatic or asymptomatic, with a positive test for leukocytes and/or nitrites, must be treated.
– Urine culture should be done, if available, after a positive dipstick test to confirm the infection and identify the causal pathogen.

Treatment

– Increase fluid intake: at least 1.5 litre/day

– Antibiotic treatment:

Uncomplicated cystitis in non pregnant women
Either monodose treatment:
ciprofloxacin PO: 500 mg as a single dose
Or conventional treatment:
nitrofurantoin PO (except in patients with G6PD deficiency): 200 mg/day in 2 divided doses for 5 days
Whichever treatment, explain to the patient that symptoms may persist for 48 hours.
In the event of treatment failure:
ciprofloxacin PO: 1 g/day in 2 divided doses for 5 days

Complicated or recurrent cystitis in non pregnant women
ciprofloxacin PO : 1 g/day in 2 divided doses for 5 days

Cystitis in men
ciprofloxacin PO: 1 g/day in 2 divided doses for 10 days

Cystitis and asymptomatic bacteriuria in pregnant or lactating women
cefixime PO: 400 mg/day in 2 divided doses for 5 days
or **nitrofurantoin** PO (except in the last month of pregnancy):
200 mg/day in 2 divided doses for 5 days

– For patients with recurrent cystitis, consider bladder stones, urinary schistosomiasis, urinary tuberculosis or gonorrhoea (examine the partner).

Acute pyelonephritis

Acute infection of the renal parenchyma during an ascending urinary tract infection, most commonly due to *Escherichia coli*.

Clinical signs

– In infants and young children: the only sign is high fever, particularly in the form of isolated febrile attacks (with no apparent cause).
– In older children and adults: signs of cystitis (burning on urination and urinary frequency) with high fever (40°C), chills and unilateral flank pain.

Treatment

– Increase fluid intake: at least 1.5 litre/day

– Fever (see page 26) and pain (see page 28)

– Antibiotic treatment:

- In children under 12 months, there is a risk of renal complications: hospitalise
  ampicillin IV: 200 mg/kg/day in 3 injections at 8-hour intervals for 10 days
  + **gentamicin** IM: 5 mg/kg once daily for 5 days

- In children over 12 months:
  ceftriaxone IM: 80 mg/kg once daily for at least 5 days, then change to oral treatment with **cefixime** PO: 8 mg/kg day in 2 divided doses to complete 14 days of treatment

- In adults (except pregnant and lactating women):

  In the absence of signs of serious illness
  ciprofloxacin PO: 1 to 1.5 g/day in 2 or 3 divided doses for 10 to 14 days (up to 21 days if necessary)

  In the presence of signs of serious illness (vomiting, patient seen late in disease, septic shock) or if the patient is in poor general condition (malnutrition, presence of other diseases) or in the event of treatment failure after 48 hours of correct treatment: hospitalise.

  ceftriaxone IM: 1 g once daily for at least 3 days, then change to oral treatment with **cefixime** PO: 400 mg/day in 2 divided doses to complete 14 days of treatment

  or, failing that:
  ampicillin IV: 8 g/day in 3 injections at 8-hour intervals for at least 3 days, then change to oral treatment with **amoxicillin** PO: 4 g/day in 2 divided doses to complete 14 days of treatment
  + **gentamicin** IM: 3 to 6 mg once daily for 3 days

– In the event of septic shock: see *Shock*, page 20; urologic treatment for any possible obstruction.

Treatment of pyelonephritis during pregnancy

Acute pyelonephritis may be life threatening for the mother and foetus. Uterine contractions may develop.

– Hospitalise

– Antibiotic treatment:
Fluoroquinolones (ciprofloxacin, pefloxacin, ofloxacin, norfloxacin) are contra-indicated during pregnancy.

In the absence of signs of serious illness:

ceftriaxone IM: 1 g once daily for at least 3 days, then change to oral treatment with **cefixime** PO: 400 mg/day in 2 divided doses to complete 14 days of treatment
or, failing that:
ampicillin IV: 8 g/day in 3 injections at 8-hour intervals for at least 3 days, then change to oral treatment with **amoxicillin** PO: 4 g/day in 2 divided doses to complete 14 days of treatment
+ **gentamicin** IM: 3 to 6 mg once daily for 3 days

In the presence of signs of serious illness or in the event of treatment failure after 48 hours of correct treatment:

ceftriaxone: 1 to 2 g once daily by IM injection (1 g in each buttock if the dose is 2 g) or slow IV injection over 3 minutes or infusion over 30 minutes
+ **gentamicin**: 3 to 6 mg/kg once daily by IM injection or slow IV injection over 3 minutes or infusion over 30 minutes, for 5 days maximum

– For uterine contractions:
Tocolysis: **nifedipine** or **salbutamol** (see page 238).

Acute prostatitis

Acute infection of the prostate, most commonly due to Gram negative bacteria.

Clinical signs

– Signs of cystitis (burning on urination and urinary frequency) with fever in men, perineal pain is common.
– Very painful rectal examination.
– Urinalysis: leucocyturia and pyuria; haematuria may be present.

Treatment

Difficult, the infection may become chronic.

– Increase fluid intake: 3 to 4 litres/day
– Fever (see page 26) and pain (see page 28)
– Prolonged antibiotic treatment:
  ciprofloxacin PO: 1 g/day in 2 divided doses for 28 days

Sexually transmitted infections (STI)

STI facilitate the sexual transmission of HIV, and may be very difficult to treat in HIV infected patients. Effective STI control is one of the main strategies for the prevention of HIV transmission.

The aetiological diagnosis and treatment of STI present several difficulties:
– Diagnoses based on clinical features and/or laboratory tests available in the field are not always reliable (low sensitivity and specificity).
– Mixed infections are common (simultaneous presence of different pathogens).
– Many infections are asymptomatic.

The WHO has introduced the **syndromic management** of STI and developed standardised flowcharts. Based on the identification of consistent groups of signs and symptoms (syndromes), patients are treated for the different pathogens that may cause each syndrome. Although some flowcharts present weaknesses, syndromic management is so far the best available option to treat and control STI, in the absence of reliable laboratory tests.

Basic principles of STI management:

– The patient should be treated at his/her first encounter with the health care provider (no patient should be sent home without treatment e.g. while awaiting for laboratory results).
– The patient should be systematically re-examined after one week.
– The drugs used in all health care facilities should be at least 95% effective and when indicated, single dose regimens are preferred. The rapidly developing drug resistance of Neisseria gonorrhoea requires the use of new agents that are more expensive.
– For all syndromes, the patient's sexual partner should also be examined for STI and promptly treated. Every patient with an STI should receive information on STI, be counselled on the importance of completing treatment and on risk reduction. Condoms should be provided.
– Using the syndromic approach, STI can be effectively treated without laboratory testing. Some tests may help in diagnosing vaginal and urethral discharge, but they should never delay treatment and results should be available within one hour.
– Routine bimanual and abdominal examinations should be carried out on all women with a presumptive STI to exclude a pelvic inflammatory disease.

Flowcharts using laboratory testing have been developed by the WHO but are not included in this chapter.

The management of the following 3 syndromes is developed in this chapter: **vaginal discharge**, **urethral discharge** and **genital ulcers**.

Less frequent STI are described later in this chapter (**lymphogranuloma venereum**, **donovanosis** and **venereal warts**).

The management of **pelvic inflammatory diseases** is described on page 231 (for convenience, **venereal** and **puerperal** infections of the uterus and fallopian tubes have been grouped together).

At the end of the chapter, the clinical signs and treatment of each STI are summarized in a table.

Special situation : sexual violence

Taking into consideration the physical, psychological, legal and social consequences of sexual violence, the *medical care* is not limited to the diagnosis and treatment of genital injuries or infections.

Care includes listening to the victim's story (see *history taking*, page 10), a complete physical examination, laboratory tests and completion of a medical certificate (see *Practical advice for writing medical certificates in the event of sexual violence*, pages 340, 341, 342).

During the consultation, prophylactic and/or curative treatments must be proposed to the patient.

– Prophylactic treatment:
  - priority is given to the risk of HIV transmission (earliest possible antiviral therapy for patients seen within 48 to 72 hours after exposure, see *HIV infection and AIDS*, page 199) and to the risk of pregnancy resulting from rape (start emergency contraception within 72 hours if possible[1]);
  - prevention of sexually transmitted infections includes treatment of syphilis AND gonorrhoea AND chlamydia infection (at curative doses, see protocols in this chapter). If necessary, treatment of trichomoniasis may follow;
  - tetanus prophylaxis and/or vaccination (see *Tetanus*, page 164) if there are any wounds (particularly if soiled with earth and plants) or if the vaccination status is unknown;
  - vaccination against hepatitis B (see *Viral hepatitis*, page 189, *accelerated vaccination schedule*).
– Curative treatment:
  - injuries/wounds,
  - if the event is not recent, any related pathologies.

Mental health care is necessary irrespective of any delay between the event and the patient arriving for a consultation. Care is based on immediate attention (reception, listening) and if necessary, follow-up care with a view to detecting and treating any psychological and/or psychiatric sequelae (anxiety, depression, post-traumatic stress disorder, see page 289).

1 **levonorgestrel** PO: one 1500 µg tablet or two 750 µg tablets as a single dose
Nevertheless, between 72 and 120 hours (5 days) after the rape, emergency contraception is still sufficiently effective to be administered.

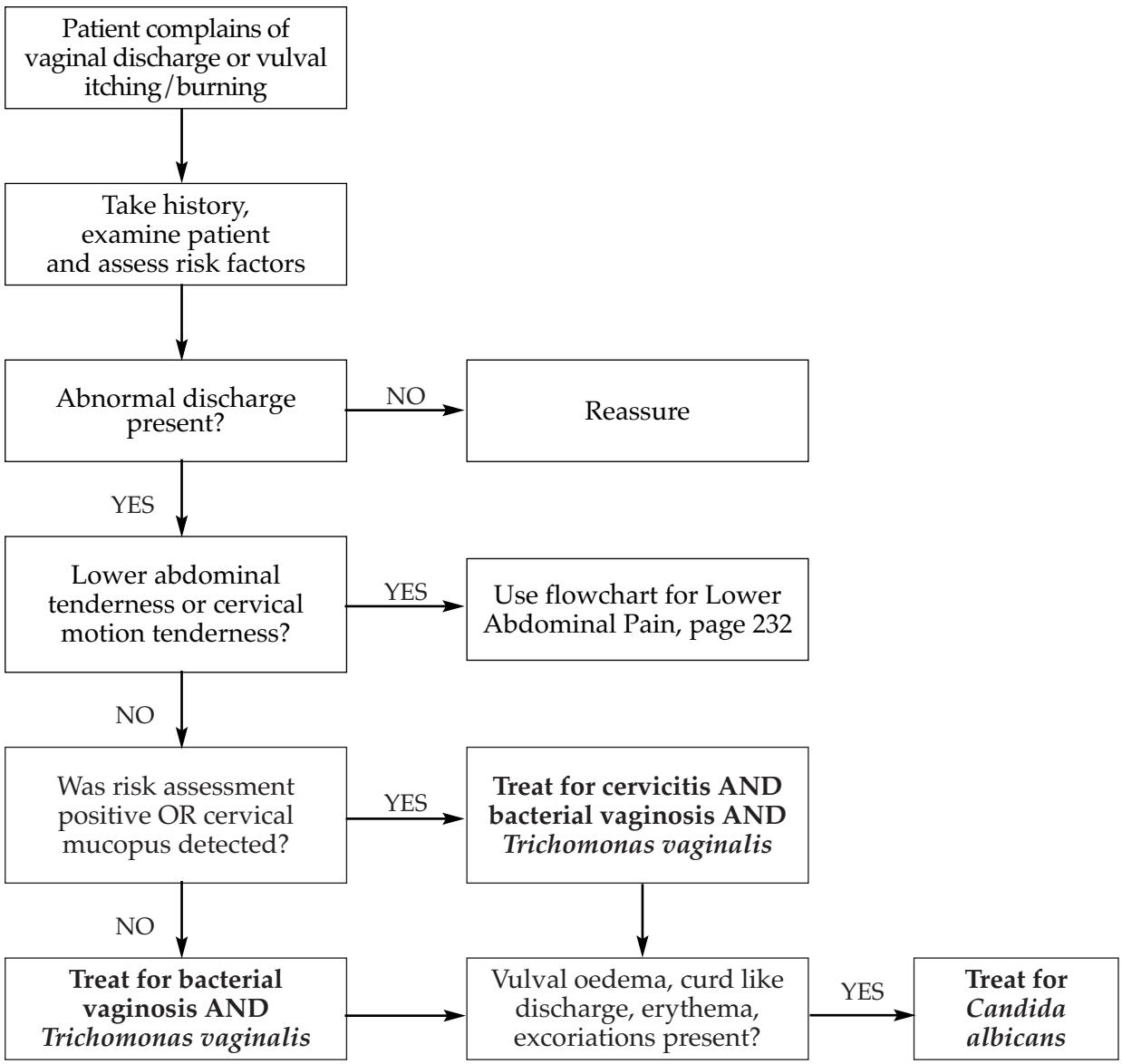
Vaginal discharge

Abnormal vaginal discharge is most commonly due to a vaginal infection (vaginitis). Infection of the cervix (cervicitis) is less frequent and more severe. Various pathogens may cause vaginitis and cervicitis. The most common pathogens are:

Vaginitis	**Cervicitis**
Trichomonas vaginalis	*Neisseria gonorrhoeae*
Gardnerella vaginalis and other associated bacteria (bacterial vaginosis)	*Chlamydia trachomatis*
Candida albicans	

Mixed infections are common.

Diagnosis and treatment (WHO flowchart)



– Cervicitis is difficult to diagnose because the clinical signs and laboratory tests are not specific. Treatment is often presumptive, taking into account risk factors.

– The risk assessment is positive when:
  • The partner presents urethral discharge or the patient presents any two of the following risk factors: age below 21 years, new partner in the previous 3 months, more than one partner in the last 3 months, single or married (risk factors need adaptation to local social situations);
  • The speculum examination shows purulent discharge from the cervix.

Note: routine bimanual and abdominal examinations should be carried out on all women with vaginal discharge to exclude a pelvic inflammatory disease.

Laboratory

– Identification of *Neisseria gonorrhoea* on gram-stained smear is not sensitive in women and therefore not recommended.

– Field laboratory tests can only identify causes of vaginitis and have limited validity. Microscopy may show motile *Trichomonas vaginalis* on wet mount (vaginal specimen must be fresh); budding yeast cells and pseudohyphae for candidiasis, and possibly clue cells (vaginal epithelial cells so heavily covered with bacteria that their borders are indistinct) for bacterial vaginosis.

– Whatever pathogen is identified, the patient should also be treated for cervicitis if indicated by risk assessment.

Treatment

– ***Treatment of vaginitis***

  All women with vaginal discharge should receive systematic treatment with metronidazole to cover *Trichomonas vaginalis* and bacterial vaginosis.

  • For *Trichomonas vaginalis* and bacterial vaginosis

    metronidazole PO[1]: 2 g as a single dose
    or, in the event of treatment failure:
    metronidazole PO: 800 to 1000 mg/day in 2 divided doses for 7 days
    Avoid alcohol during treatment.

  • For candidiasis

    clotrimazole (500 mg vaginal tablet inserted high into the vagina): a single application at bedtime
    or
    clotrimazole (200 mg vaginal tablet inserted high into the vagina): one application at bedtime for 3 days
    or, failing that,
    nystatin (100 000 IU vaginal tablet inserted high into the vagina): one application at bedtime for 14 days

[1] Metronidazole PO may be replaced by **tinidazole** PO: 2 g as a single dose or 1 g/day in 2 divided doses for 5 days

– ***Treatment of cervicitis (except in pregnant and lactating women)***

  • For chlamydia

  azithromycin PO: 1 g as a single dose
  or
  doxycycline PO: 200 mg/day in 2 divided doses for 7 days

  PLUS

  • For gonorrhoea

  cefixime PO: 400 mg as a single dose
  or
  spectinomycin IM: 2 g as a single dose
  or
  ceftriaxone IM: 125 mg as a single dose

– ***Treatment of cervicitis in pregnant and lactating women***

  • For chlamydia

  azithromycin PO: 1 g as a single dose
  or
  erythromycin PO: 2 g/day in 2 or 4 divided doses for 7 days

  PLUS

  • For gonorrhoea

  cefixime PO: 400 mg as a single dose
  or
  ceftriaxone IM: 125 mg as a single dose

Notes:

– Ciprofloxacin (500 mg PO as a single dose) is no longer effective in most Asian countries and resistance is increasing in many other areas. Avoid its use unless susceptibility is proven and is regularly monitored.
  Ciprofloxacin is contra-indicated in pregnant women and not recommended in children and adolescents.
– Avoid cotrimoxazole and kanamycin as resistance is high in the majority of countries (unless drug susceptibility is monitored at regular intervals and remains above 95%).
– **azithromycin** PO given as a single dose of 2 g may be an alternative that simultaneously treats both gonorrhoea and chlamydia. However, adverse gastrointestinal effects are frequent at this dosage.

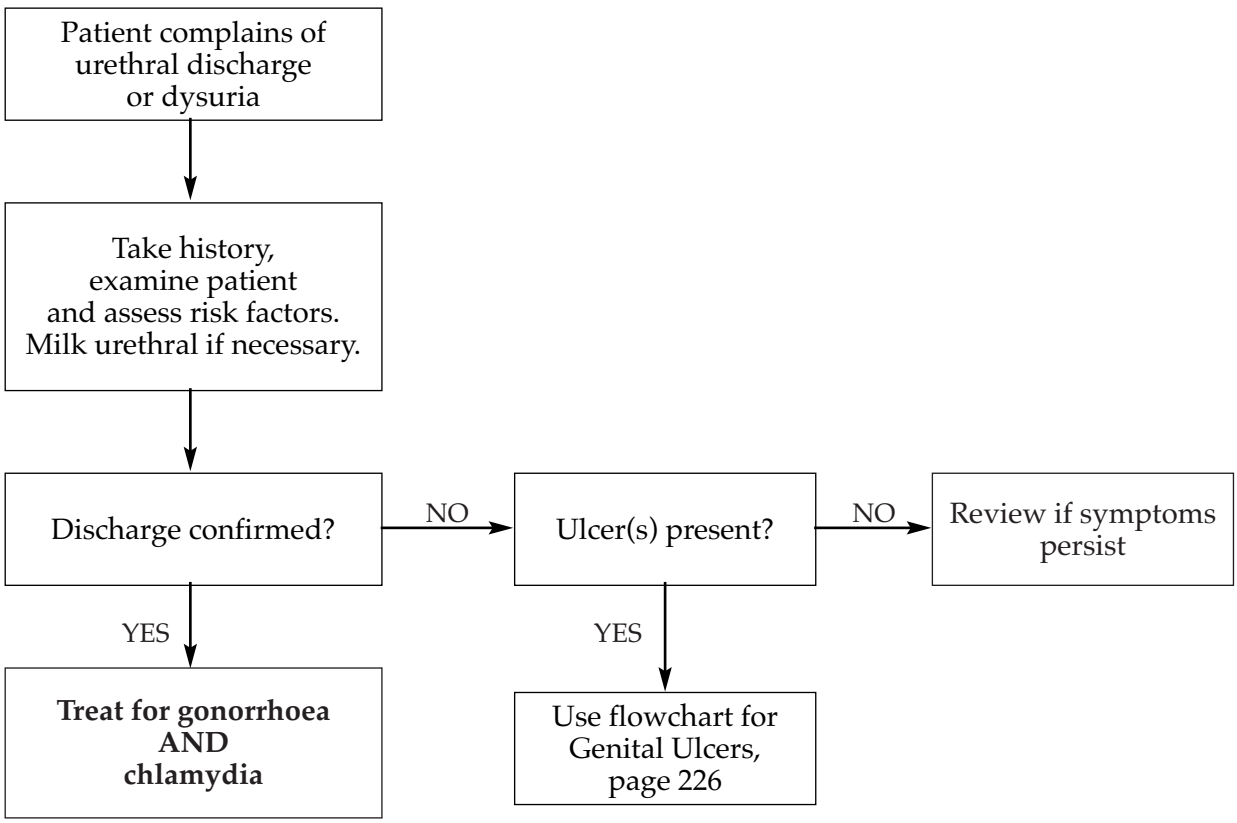
Urethral discharge

Urethral discharge is usually encountered in men. The main responsible pathogens are *Neisseria gonorrhoea* and *Chlamydia trachomatis*. *Trichomonas vaginalis* can also be encountered. In women, clinical urethritis is less frequent and is rarely the first sign of gonococcal and/or chlamydial infections.

Clinical signs

Purulent discharge, may be accompanied by dysuria.

Diagnosis and treatment (WHO flowchart)



Laboratory

If microscopy is available, examination of an urethral smear may demonstrate gram-negative intracellular diplococci on methylene blue or gram stain in gonococcal infection. *Chlamydia trachomatis* cannot be identified by field laboratory and should always be treated presumptively:
– if no gonococci are found, treat only for chlamydia,
– if gonococci are found, treat for both gonorrhoea **AND** chlamydia.

Treatment

– ***Treatment of chlamydia***

azithromycin PO: 1 g as a single dose
or
doxycycline PO: 200 mg/day in 2 divided doses for 7 days (except in pregnant and lactating women)

PLUS

– ***Treatment of gonorrhoea***

cefixime PO: 400 mg as a single dose
or
ceftriaxone IM: 125 mg as a single dose
or
spectinomycin IM: 2 g as a single dose (except in pregnant and lactating women)

Notes:

– Ciprofloxacin (500 mg PO as a single dose) is no longer effective in most Asian countries and resistance is increasing in many other areas. Avoid use unless its susceptibility is proven and is regularly monitored. Ciprofloxacin is contra-indicated in pregnant women and not recommended in children and adolescents.
– Avoid cotrimoxazole and kanamycin as resistance is high in the majority of countries (unless drug susceptibility is monitored at regular intervals and remains above 95%).
– **azithromycin** PO given as a single dose of 2 g may be an alternative that simultaneously treats both gonorrhoea and chlamydia. However, adverse gastrointestinal effects are frequent at this dosage.

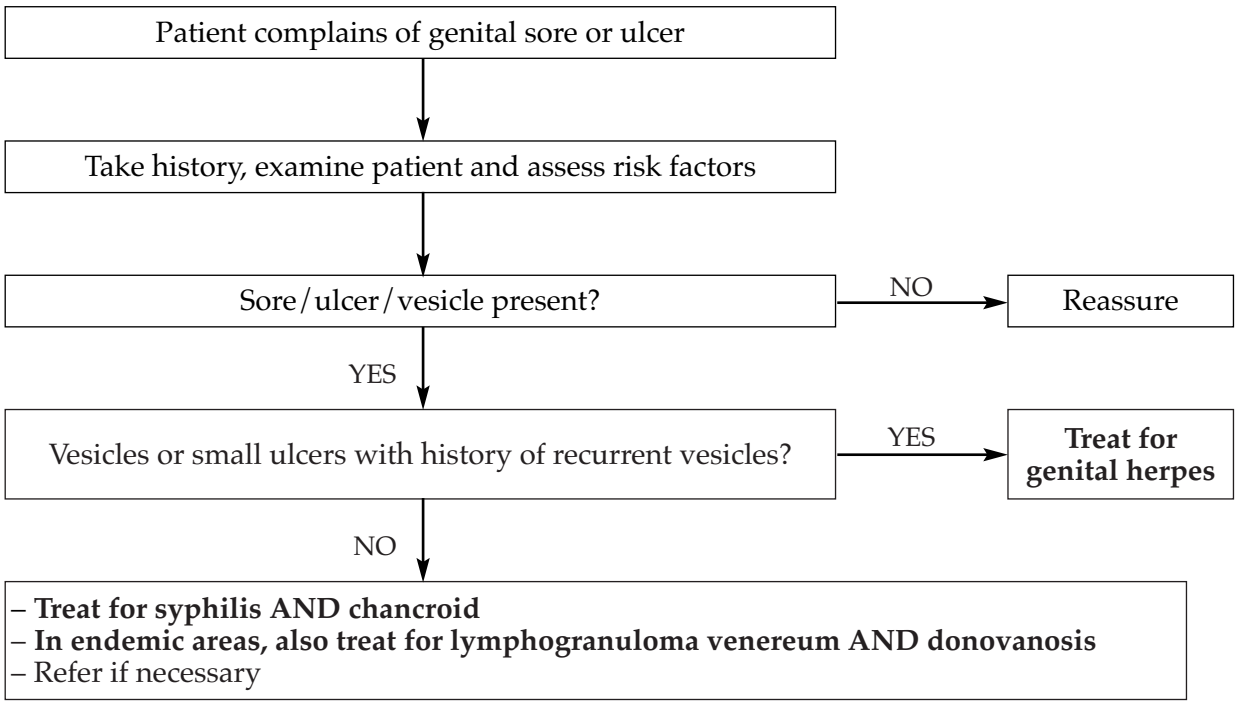
If urethral discharge persists or recurs after 7 days:

- if the patient received a treatment with high probability of resistance (cotrimoxazole, kanamycin), suspect resistant gonorrhoea and treat with **cefixime** or **spectinomycin** as above (resistant chlamydia is rare),
- if the patient received an effective antibiotic, consider *Trichomonas vaginalis* infection and treat accordingly,
- re-infection should also be considered.

Genital ulcers

The pathogens responsible for genital ulcers vary in different parts of the world. The most common are *Treponema pallidum* (syphilis), *Haemophilus ducreyi* (chancroid) and *Herpes simplex*. *Chlamydia trachomatis* (lymphogranuloma venereum) and *Calymmatobacterium granulomatis* (donovanosis) are less frequent. Mixed infections are common.

Diagnosis and treatment (WHO flowchart)



Primary infection of herpes is characterised by fever and painful clusters of vesicles on the genitals. Recurrences are usually milder and shorter in duration.

Once genital herpes is excluded, treat simultaneously for both syphilis and chancroid as they are both frequent and cannot be correctly distinguished on clinical grounds.

Laboratory

Laboratory testing available in the field is of limited use (for example: in early syphilis, syphilis serology (RPR/VDRL) may remain negative, while a positive RPR/VDRL may reflect a previous infection).

Treatment

– ***Treatment of genital herpes***

- Relieve pain with a step 1 analgesic (see *Pain*, page 28).
- Clean the area with **chlorhexidine + cetrimide** and apply **gentian violet** for 5 days.

- **aciclovir** PO:
  In patients with a first-episode, treatment, when given early (ideally within 24 hours following the onset of symptoms), may reduce the duration of symptoms and speed healing: 1200 mg/day in 3 divided doses or 1000 mg/day in 5 divided doses for 7 days.
  In patients with recurrence, give the same dosage for 5 days, but treatment is only effective if initiated during the prodromic phase.
  In patients with frequent recurrences (more than 6 episodes per year), see *HIV infection and AIDS*, page 201.

– ***Treatment of syphilis***

benzathine benzylpenicillin IM: 2.4 MIU as a single dose (half the dose in each buttock)
For patients allergic to penicillin:
doxycycline PO (except in pregnant or lactating women): 200 mg/day in 2 divided doses for 14 days
or, for pregnant or lactating women:
erythromycin PO: 2 g/day in 2 or 4 divided doses for 14 days

PLUS

– ***Treatment of chancroid***

erythromycin PO: 2 g/day in 2 or 4 divided doses for 7 days
or
ciprofloxacin PO: 1 g/day in 2 divided doses for 3 days (except in pregnant or lactating women)
or
azithromycin PO: 1 g as a single dose
or
ceftriaxone IM: 250 mg as a single dose

Fluctuant lymph nodes may be aspirated through surrounding healthy skin as required. Never incise and drain lymph nodes.

If treatment is ineffective, consider lymphogranuloma venereum or donovanosis.

Lymphogranuloma venereum (LGV)

LGV is a chronic disease due to *Chlamydia trachomatis*, predominantly affecting men (frequently latent in women).

Clinical signs

– Small ulcers, often absent.
– Painful and fluctuant inguinal bubo. Fistulae may develop, but are rare.

Laboratory

Diagnosis is difficult.

Treatment

– ***Treatment of lymphogranuloma venereum***

doxycycline PO (except in pregnant or lactating women): 200 mg/day in 2 divided doses for 14 days
or, in pregnant and lactating women:
erythromycin PO: 2 g/day in 2 or 4 divided doses for 14 days

Treatment may last up to 21 days.

– ***Treatment of genital ulcers***

It is difficult to clinically distinguish different genital ulcers. Therefore, for any genital ulcer, even if characteristic of lymphogranuloma venereum, follow the flowchart for the management of genital ulcers, page 226.

– ***Treatment of inguinal bubo***

Fluctuant lymph nodes may be aspirated through surrounding healthy skin as required. Never incise and drain lymph nodes.

Donovanosis
(Granuloma inguinale)

Donovanosis, an infection due to *Calymmatobacterium granulomatis*, is found in some tropical and sub-tropical countries: South Africa, Papua New Guinea, Australia, India, Brazil, Guyana, the Caribbean and rarely in other African or Asian countries.

Clinical signs

– Painless granulomatous, progressive and ulcerative lesions of the external genitals. Ulcers often bleed easily when touched.
– If left untreated, lesions may diffuse and cause tissue destruction.

Treatment

Treatment lasts for a minimun of 14 days, longer if necessary, until the complete disappearance of the lesions (otherwise risk of recurrence):
azithromycin PO: 1 g the first day followed by 500 mg once daily
or **doxycyline** PO (except in pregnant or lactating women): 200 mg/day in 2 divided doses
or **erythromycin** PO: 2 g/day in 2 or 4 divided doses

In HIV infected patients, add **gentamicin** IM: 3 to 6 mg/kg/day in 1 or 2 injections.

Veneral warts

Veneral warts are a very contagious infection due to the *human papillomavirus* (HPV).

Clinical signs

– Presents mostly as condyloma acuminata (small soft growths) or flat papular warts with no other signs. Warts are painless and often present on more than one site. Warts are commonly found on the external genitals and the anal region, but the rectum, vagina, cervix and urethra can be involved. If left untreated, the warts multiply. Obstructive complications are rare.

– Specific types of HPV may cause invasive carcinoma of the cervix. Colposcopy and annual cervical smears are indicated in patients with genital warts.

Treatment

Treatment is difficult and relapses are frequent.

– Local disinfection with **chlorhexidine + cetrimide** (see preparation, page 246)

– Small warts on the external genitals, vagina or perianal area are treated with podophyllum preparations:
  • Protect the unaffected skin with vaseline or zinc ointment.
  • Cautiously apply **0.5% podophyllotoxin** to the warts.
  • Allow to dry. For vaginal warts, treatment must be applied by medical staff. Allow to dry before removing the speculum.
  • Apply twice daily. Repeat on 3 consecutive days per week for a maximum of 4 weeks.

  OR
  • Protect the unaffected skin with vaseline or zinc ointment: improper treatment can cause painful ulcerations.
  • Cautiously apply **10%** or **25% podophyllum resin** (it is much more caustic and must only be applied by medical staff).
  • Allow to dry. For vaginal warts allow to dry before removing the speculum.
  • Wait 1 to 4 hours before washing with soap and water.
  • Apply once weekly.
  • If after 4 weeks this treatment is unsuccessful, an alternative treatment should be tried.

  Warning: podophyllum preparations are strictly contra-indicated in pregnant and lactating women. They should not be used on cervical, urethral and anal lesions, nor for extensive lesions.

– Treatment for lesions larger than 3 cm or cervical, urethral or rectal lesions: cryotherapy, electrosurgery or surgical removal.

Pelvic inflammatory disease (PID)

– Sexually transmitted or puerperal infection of the uterus (endometritis) and/or of the fallopian tubes (salpingitis) that may lead to pelvic peritonitis, pelvic abscess or septicaemia.

– Sexually transmitted infections are often due to *Neisseria gonorrhoeae* and *Chlamydia trachomatis*.

– Puerperal infections are often due to anaerobic bacteria and other micro-organisms that are part of the normal vaginal flora.

Clinical signs of sexually transmitted infection

PID is difficult to diagnose because clinical manifestations vary.

Symptoms suggestive of PID include: abdominal pain, fever, dyspareunia, vaginal discharge, dysmenorrhoea, menorrhagia and metrorrhagia, dysuria, and sometimes nausea and vomiting. Fever is not always present.

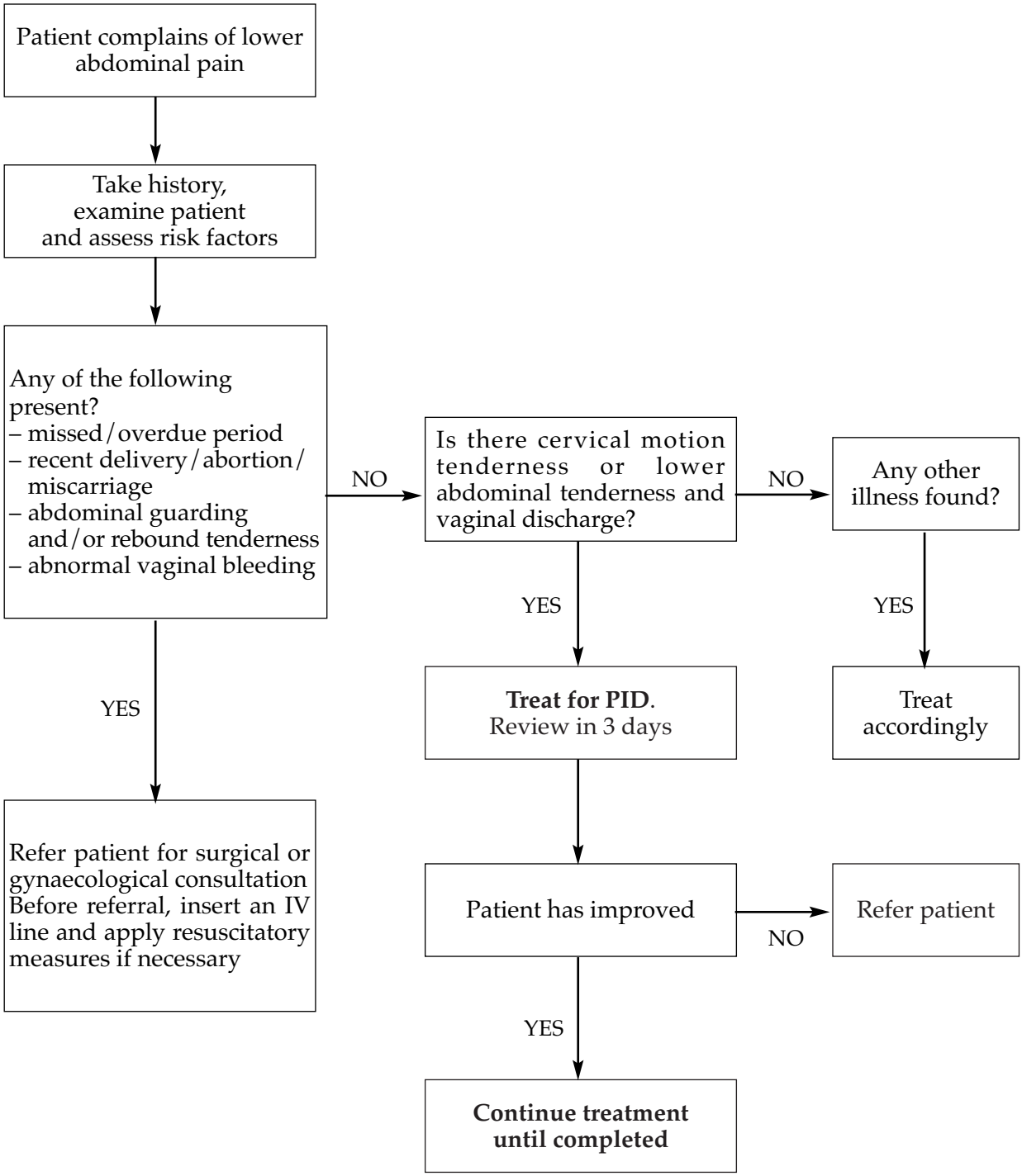
PID is highly probable when one or more of these symptoms are associated with adnexal tenderness, cervical motion tenderness, evidence of a lower genital tract infection or a tender pelvic mass.

Diagnosis and treatment (WHO flowchart)

See next page.

Criteria for hospitalisation:

– the patient is pregnant
– the diagnosis is uncertain
– surgical emergencies such as ectopic pregnancy and appendicitis cannot be excluded
– a pelvic abscess is suspected
– severe illness precludes management on an outpatient basis
– the patient is unable to follow or tolerate outpatient treatment
– the patient has failed to respond after 72 hours of outpatient treatment



Treatment of veneral infections

– Treatment must be effective against *N. gonorrhoea*, *C. trachomatis* and anaerobic bacteria.

– If an intra-uterine device (IUD) is in place, it should be removed.

– Antibiotic treatment:

  • Outpatient therapy:
  ceftriaxone IM: 125 mg as a single dose
  or **cefixime** PO: 400 mg as a single dose
  or **spectinomycin** IM (except for pregnant women): 2 g as a single dose
  PLUS
  doxycycline PO (except in pregnant or lactating women): 200 mg/day in 2 divided doses for 14 days
  or, for pregnant and lactating women, **erythromycin** PO: 2 g/day in 2 or 4 divided doses for 14 days
  PLUS
  metronidazole PO: 1 g/day in 2 divided doses for 14 days
  Outpatients should be followed up after 72 hours and admitted for inpatient therapy if their condition has not improved or has deteriorated.

  • Inpatient therapy:
  ceftriaxone IM: 250 mg once daily
  or **spectinomycin** IM (except for pregnant women): 4 g/day in 4 injections
  PLUS
  doxycycline PO (except in pregnant or lactating women): 200 mg/day in 2 divided doses
  or, for pregnant and lactating women: **erythromycin** PO: 2 g/day in 2 or 4 divided doses
  PLUS
  metronidazole PO or IV: 1 g/day in 2 divided doses or infusions
  or **chloramphenicol** PO or IV (except for pregnant women): 2 g/day in 4 divided doses or injections
  Treatment should be continued until at least 2 days after the patient has improved and should be followed by **doxycycline** PO 200 mg/day in 2 divided doses for 14 days (erythromycin in pregnant women).

Clinical signs of puerperal infection

Fever with chills, abdominal pain, purulent or foul-smelling vaginal discharge; enlarged, soft and painful uterus; occasionally shock following a delivery, miscarriage or abortion.

Treatment of puerperal infection

– In practice, it is impossible to distinguish endometritis from salpingitis or parametritis. Treatment must cover all of these pelvic infections.

– Antibiotic treatment:
ampicillin IV: 8 g/day in 3 to 4 infusions
+ **gentamicin** IM: 5 mg/kg once daily
+ **metronidazole** PO: 1.5 g/day in 3 divided doses
Continue treatment for 48 hours after the fever disappears

– If the placenta is retained: carry out manual removal (aided, if necessary, by the largest curette possible).

– If peritonitis or pelvic abscess are suspected, use the same antibiotic treatment and consider surgery.

Major sexually transmitted infections: a summary

Pathogens	Most common clinical features	Laboratory	Treatment
Neisseria gonorrhoeae	– In women: vaginal discharge, mucopurulent cervical discharge, dysuria, menorrhagia (around 50% of infections are asymptomatic). – In men: purulent urethral discharge and sometimes dysuria (5 to 50% of infections are asymptomatic).	– In women: not valid (not sensitive) – In men: Gram or methylene blue stain: intracellular diplococci and polymorphonuclear leucocytes (more than 4 per field).	**cefixime** PO: 400 mg as a single dose or **spectinomycin** IM[1]: 2 g as a single dose or **ceftriaxone** IM: 125 mg as a single dose – Avoid ciprofloxacin unless susceptibility is proven. – Treat also for chlamydial infection.
Chlamydia trachomatis	– In women: vaginal discharge, cervicitis, salpingitis, endometritis and rarely dysuria (more than 50% of infections are asymptomatic). – In men: mild to moderate urethral discharge and/or dysuria. Up to 90% of infections are asymptomatic.	– On microscopy, increased polymorphonuclear leucocytes. Best methods are PCR/LCR. – Culture and serology have low sensitivity.	**azithromycin** PO: 1 g as a single dose or **doxycycline** PO[1]: 200 mg/day for 7 days – Treat also for gonococcal infection, except when a Gram stain in males shows no *Neisseria gonorrhoeae*.
Trichomonas vaginalis	– In women: yellow-green vaginal discharge, sometimes foul smelling, vulval irritation (10 to 50% of infections are asymptomatic). – In men: most infections are asymptomatic. Can produce urethritis with mild discharge and sometimes dysuria.	– Wet mount of fresh vaginal fluid shows motile trichomonas (low sensitivity). – pH of urethral/vaginal fluid > 4.5	**metronidazole** PO: 2 g as a single dose or **metronidazole** PO: 800 to 1000 mg/day for 7 days This treatment covers also bacterial vaginosis, from which it cannot be easily distinguished on clinical grounds.
Bacterial vaginosis (*Gardnerella vaginalis* and other associated bacteria)	Diagnosis is made in the presence of 3 of the following 4 signs: – Homogenous grey-white adherent vaginal discharge – pH of vaginal fluid > 4.5 – Vaginal fluid has an amine (fishy) odour, especially when mixed with 10% KOH – Presence of clue cells in wet mount or Gram stain of vaginal fluid		**metronidazole** PO: 2 g as a single dose or **metronidazole** PO: 800 to 1000 mg/day for 7 days This treatment covers also trichomoniasis, from which it cannot be easily distinguished on clinical grounds.

Pathogens	Most common clinical features	Laboratory	Treatment
Candida albicans	– Mainly seen in women: pruritus and vulvovaginitis, frequently creamy-white vaginal discharge, sometimes dysuria. – In men: balanitis or rarely urethritis.	– Saline or KOH wet mount of fresh vaginal fluid shows budding yeast cells and pseudohyphae – pH of vaginal fluid: normal	**clotrimazole** 500 mg: one vaginal tablet as a single dose or **clotrimazole** 200 mg: one tablet vaginal/day for 3 days or **nystatine** 100 000 IU: one vaginal tablet/day for 14 days
Human herpes simplex virus type 2	Many asymptomatic carriers. Multiple vesicles on genitals leading to painful ulcerations. In women, affects vulva, vagina and cervix; in males, penis and sometimes urethra. In primary episodes, fever (30%) and adenopathy (50%). Recurrences in 1/3 of infections with shorter and milder symptoms.	Diagnosis by culture, serology and PCR/LCR done exclusively at a reference laboratory.	Analgesics (step1), local disinfection. If available, **aciclovir** PO given within 24 hours after onset of lesions: 1 to 1.2 g/day for 7 days in primary episode and for 5 days in recurrent infections.
Treponema pallidum	– *Primary*: single firm painless genital ulcer, often unnoticed. – *Secondary* (after 4 to 6 weeks): macular and/or papular rash, involving palms and soles, adenopathy, mucosal lesions, osteitis. If left untreated, "latent" syphilis with relapses (25%). – *Late* : cardiovascular disease, neurosyphilis.	– *Primary*: treponema on dark field or TPHA. Positive RPR only in 70% of cases. – *Secondary*: treponema on dark field, RPR, FTA and TPHA. – *Late*: RPR, VDRL or TPHA.	**benzathine benzylpenicillin** IM: 2.4 MIU as a single dose. In late syphilis: one injection/week for 3 weeks For penicillin-allergic patients: **doxycycline** PO[1]: 200 mg/day for 14 days (30 days in late syphilis) or **erythromycin** PO: 2 g/day for 14 days (30 days in late syphilis). If genital ulcers are present, treat also for chancroid.
Haemophylus ducreyi	Painful single (or multiple) genital ulcer (soft chancre, bleeds easily when touched). Painful and voluminous inguinal adenitis in 50%. Fistulae develop in 25% of cases.	*H. ducreyi* bacillus is difficult to identify on microscopy or by culture.	**erythromycin** PO: 2 g/day for 7 days or **ciprofloxacin** PO[1]: 1 g/day for 3 days or **azithromycin** PO: 1 g as a single dose If genital ulcers are present, treat also for primary syphilis.

[1] Warning: ciprofloxacin, doxycycline and spectinomycin are contra-indicated in pregnant and lactating women; refer to the main text.

Metrorrhagia

– Abnormal uterine bleeding outside menstrual periods. Severe haemorrhage (internal or external) may cause shock. For treatment of haemorrhagic shock, see *Shock*, page 19.
– For more information, refer to the MSF handbook, *Obstetrics in remote areas*.

Outside pregnancy

Management is based on bimanual examination and vaginal examination with a speculum.

– **First case: the surface of the cervix is bleeding**
  • Inflammation of the cervix associated with signs of vaginitis. Take a sample for laboratory examination (if available) and treat for vaginitis (see *Vaginal discharge*, page 221).
  • Friable, hard mass with visible blood vessels: cervical cancer. Refer to a surgical centre.

– **Second case: bleeding from the uterine cavity**
  • Enlarged, irregular uterus: uterine fibroids
  norethisterone PO: 5 to 10 mg from the 10th to the 25th day of the menstrual cycle for three cycles, then adapt according to the clinical evolution. Only consider surgery if large fibroids cause considerable bleeding.
  • Normal uterus with adnexal mass or mass in the pouch of Douglas: exclude ectopic pregnancy (see next page). Refer to a surgical centre.
  • Uterine motion tenderness, pelvic pain, purulent discharge: consider a pelvic infection (see *Pelvic inflammatory disease*, page 231).
  • Normal uterus and cervix: consider poorly tolerated or poorly taken contraceptives; endometrial cancer, particularly in postmenopausal women; *S. haematobium* schistosomiasis in endemic areas (see page 144).

– **For any woman with metrorrhagia**, prevent or treat anaemia with: **elemental iron**[1] + **folic acid** PO
  • Prevention: 60 to 120 mg of elemental iron once daily or in 2 divided doses for 1 to 2 months (1 to 2 tablets ferrous sulphate 200 mg + folic acid 0.25 mg/day)
  • Treatment: 120 to 180 mg/day of elemental iron in 2 to 3 divided doses for 2 months (2 to 3 tablets ferrous sulphate 200 mg + folic acid 0.25 mg/day)

During the first half of pregnancy

Threatened abortion

Minimal bleeding, cramping pain, closed cervix.

Management: rest, monitor pulse and blood pressure.

[1] 200 mg ferrous sulfate = 65 mg elemental iron; 200 mg ferrous fumarate = 65 mg elemental iron; 300 mg ferrous gluconate = 35 mg elemental iron.

Abortion

More or less abundant bleeding, uterine contractions, open cervix, expulsion of products of conception.

Management:

– Insert an IV line using a large calibre catheter (16G), and if necessary, administer a **plasma expander** or **Ringer Lactate**. Monitor pulse and blood pressure.

– Evacuation of the uterus:
Between 8 and 12 weeks of pregnancy: manual vacuum aspiration (MVA), manual removal or curettage to remove any products of conception which may cause bleeding and infection. If infection is suspected, curettage must be undertaken with caution.
After 12 weeks of pregnancy: the placenta is usually evacuated with the foetus. If evacuation is incomplete or in the event of haemorrhage: manual removal immediately after the expulsion, before the uterus retracts or the cervix closes. If the manual removal is delayed, curettage must be performed, which carries a high risk of uterine perforation.

– Tetanus prophylaxis (see *Tetanus*, page 164); malaria treatment or prophylaxis following thick and thin films in endemic areas (see *Malaria*, page 127).

– In the event of post-abortion infection (fever, abdominal pain, uterine tenderness, foul-smelling vaginal discharge): antibiotic treatment, see *treatment of puerperal infection*, page 233.

Ectopic pregnancy

Pregnancy in which implantation of a fertilized ovum occurs outside the uterine cavity, most commonly in a fallopian tube.

– Amenorrhoea then, in the majority of women: shock due to intraperitoneal haemorrhage, slight vaginal bleeding not corresponding to the severity of shock, marked pelvic pain, distended abdomen.

– On examination: tender mass in one adnexum, pain in the pouch of Douglas (haemoperitoneum).

Management: insert an IV line using a large calibre catheter (16G) and refer urgently to a surgical centre for laparotomy.

Hydatidiform mole

Pregnancy without foetus nor amniotic sac, due to a cystic degeneration of the placenta.

– Vaginal bleeding with or without alteration in the general condition, nausea, vomiting. Translucent vesicles of 1 to 2 cm diameter, linked by filaments (grape-like appearance) may be expelled during haemorrhage.

– On examination: uterus larger and softer than expected for estimated gestational age.

Management:

– Insert an IV line using a large calibre catheter (16G), evacuate the mole by manual removal if possible (risk of perforation during curettage).

– Long term follow-up: ensure the woman uses effective contraception for one year. Perform a pregnancy test every month for 3 months, then every 2 months for one year. If (while using a contraceptive) a pregnancy test is positive during this period: perform another curettage, suspect a choriocarcinoma and refer for treatment.

During the second half of pregnancy

Premature labour

Slight bleeding and preterm contractions, effacement and dilation of the cervix; examination otherwise normal.

Management:

– Strict bed rest.

– Tocolysis:
As first-line treatment, use **nifedipine** PO (short-acting capsule): 10 mg by oral route, to be repeated every 15 minutes if uterine contractions persist (maximum 4 doses or 40 mg), then 20 mg every 6 hours for 48 hours
or, if not available,
salbutamol IV infusion for a maximum of 48 hours: dilute 5 mg (10 ampoules of 0.5 mg) in 500 ml of 5% glucose or 0.9% sodium chloride to obtain a solution of 10 micrograms/ml.
Start infusion at the rate of 15 to 20 micrograms/minute (30 to 40 drops/minute).
If contractions persist, increase the rate by 10 to 20 drops/minute every 30 minutes until uterine contractions cease. Do not exceed 45 micrograms/minute (90 drops/minute).
Continue for one hour after contractions have ceased, then reduce the rate by half every 6 hours.
Monitor maternal pulse regularly, decrease the infusion rate in the event of maternal tachycardia > 120/minute.

Note: do not administer nifedipine and salbutamol simultaneously.

Placenta praevia

Abnormal implantation of the placenta, which may either entirely or partially cover the internal os of the cervix.

– Sudden, painless, more or less profuse, bright red bleeding.

– Examination must be carried out very carefully so as not to provoke a cataclysmic haemorrhage: uterus is soft. If the cervix is dilated, the placenta can be felt in the cervix. **Do not repeat the examination**.

Management:

– Strict bed rest in a lying position.

– Insert an IV line using a large calibre catheter (16G); monitor pulse, blood pressure and bleeding.

– Transfer to a surgical centre (consider the risk of aggravating the haemorrhage if transport conditions are difficult).
  • For a patient with significant haemorrhage: administer **Ringer Lactate**. If the condition is life threatening: transfuse screened blood (HIV, hepatitis B and C etc.). Discuss a caesarean section whatever the stage of pregnancy.
  • For a patient with regular and painful contractions, before transferring: insert an IV line and administer salbutamol as for premature labour (see above).

– If labour accelerates and transfer is not possible:
  • If the placenta covers the entire cervix: vaginal delivery is impossible, caesarean section is imperative.

  - If the placenta only partially covers the cervix: rupture of the membranes which sometimes stabilises haemostasis and induces vaginal delivery.
- Pay careful attention to risk of postpartum haemorrhage: systematic administration of **oxytocin** IM: 5 IU after delivery of the infant and/or placenta.
- If rupturing the membranes is ineffective: caesarean section.

Abruptio placenta (life threatening emergency for both mother and foetus)

Premature separation of the placenta from the uterus with formation of a blood clot between the placenta and the uterine wall.

- Sudden, severe pain in the lower abdomen. Slight vaginal bleeding (black coloured), sometimes absent. Shock (not always consistent with the external blood loss as bleeding is internal); tightly contracted uterus and foetal heart sounds absent. Often occurs in patients with pre-eclampsia.

Management:

- Insert an IV line using a large calibre catheter (16G), administer **Ringer Lactate**. Monitor pulse, blood pressure and bleeding. If the condition is life threatening: transfuse screened blood (HIV, hepatitis B and C etc.).

First case: the foetus is alive

- If the patient is primigravid or if labour has not started or is not advanced: urgent referral for caesarean section. If a caesarean section is impossible, induce vaginal delivery.
- If the labour is well advanced: rapid delivery (rupture of the membranes, vacuum extraction, forceps, give pethidine or nalbuphine). Oxytocin if necessary, while monitoring the foetal heart rate.

Second case: the foetus is dead

- Rapid delivery (rupture of the membranes, vacuum extraction, forceps). Give any step 3 analgesic (see *Pain*, page 28). Administer **oxytocin** to strengthen the uterine contractions: 5 IU diluted in 500 ml of 5% glucose at a rate of 2 to 8 drops/minute up to a maximum of 40 drops/minute. Caesarean section may be necessary.

For all patients

- Manual removal of the placenta and/or manual exploration of the uterus.
- Systematic administration of **oxytocin** after delivery of the placenta:
  - After a vaginal delivery: 5 IU by IM injection (to prevent postpartum haemorrhage)
  - After a caesarean section: 5 IU by slow, direct IV injection then 10 IU by IV infusion over 2 hours

After delivery

Postpartum haemorrhage

Excessive bleeding in the first 24 hours following the delivery of the infant, mainly due to placental retention and uterine atonia. Postpartum haemorrhage may also result from uterine rupture or cervical lacerations.

Management:

- If the placenta is retained: manual removal.

– If the placenta is not retained: manual exploration of the uterine cavity for damage.
– Check for vaginal or cervical lacerations using a retractor.
– Administer **oxytocin** IM or slow IV: 5 to 10 IU to be repeated until the uterus is well contracted (if not available, use **methylergometrine** IM: 0.2 mg to be repeated if necessary without exceeding 5 injections).
– Tranfusion if the blood loss exceeds 1500 ml or in the absence of clots (blood screened for HIV, hepatitis B and C etc.).

Note: postpartum haemorrhage after vaginal delivery can be prevented by systematic administration of **oxytocin** IM: 5 IU after delivey of the infant (check for twins) and/or placenta.

CHAPTER 10

Medical and minor surgical procedures

Dressings

– The objective of dressing wounds is to promote healing and prevent infection. The procedure includes cleaning, disinfection and protection of the wound while respecting the rules of hygiene.

– Not all wounds need to be covered by a dressing. Under some conditions – heat, humidity – a dressing may increase the risk of infection (e.g. a clean wound that has been sutured for several days; a small dry wound not requiring sutures).

Material

– **Standard dressing set**
  • one Kocher or Pean forceps,
  • one dissecting forceps,
  • one pair of surgical scissors or one scalpel to excise necrotic tissue and to cut gauze or sutures,
  • 5 to 10 gauze compresses can be added or can be packed separately.

  Instruments for **one** dressing for **one** patient must be wrapped together in paper or fabric (or can be placed in a metallic box) and sterilised together to limit handling and breaks in asepsis.
  If there are no sterile instruments, a dressing can be done using sterile gloves.

– **Renewable supplies**
  • sterile compresses; sterilised in a small drum or wrapped and sterilised in packets of 5 or 10,
  • non-sterile disposable gloves,
  • adhesive tape and/or crepe or gauze bandage,
  • 0.9% sodium chloride or, failing that, filtered and boiled water,
  • antiseptic (see *use of antiseptics*, page 246),
  • analgesics.

Organisation of care

Proper organization of care helps maintain the rules of asepsis and decreases the risk of accidental contamination of a wound or transmission of organisms from one patient to another:

– Assign one room for dressings. It must be meticulously cleaned and the waste removed every day. The dressing table must be disinfected after each patient.

– Dressings may be applied at the bedside if the patient's condition requires. If possible, use a clean, disinfected dressing trolley with: on the upper tray, sterile and/or clean material (dressing set, extra compresses etc.); and on the lower tray, septic material (container for contaminated instruments, sharps disposal container and a container or garbage bag for waste).

– Prepare all the necessary material in a well lit area. If necessary, arrange for an assistant to be present.
– Wear protective glasses if there is a risk of projection from an oozing wound.
– Always proceed from clean to dirty: start with patients with uninfected wounds. If there are multiple dressings for one patient, start with the cleanest wound.

Technique

– If the procedure may be painful, give an analgesic and wait the necessary time for the drug to take effect before starting the procedure (see *Pain*, page 28).
– Settle the patient comfortably in an area where his privacy is respected throughout the procedure.
– Explain the procedure to the patient and obtain his co-operation.
– Instruments (or sterile gloves) must be changed between patients.
– To prevent drug interactions, use the same antiseptic for all care of one patient (see *use of antiseptics*, page 246).

Removal of an old dressing

– Wash hands (simple hand washing for at least 15 seconds with ordinary soap).
– Put on non-sterile gloves and remove the adhesive tape, bandage, and superficial compresses.
– Proceed gently with the last compresses. If they stick to the wound, loosen them with liquid antiseptic before removal.
– Observe the soiled compresses. If there is significant discharge, a greenish colour or a foul odour, the wound is likely infected.
– Discard the dressing and the non-sterile gloves in the waste container.

Observe the wound

– In case of an open wound, loss of cutaneous tissue or ulcer, the colour is an indicator of the stage in the healing process:
  • **black** area = necrosis, wet or dry infected eschar,
  • **yellow** or **greenish** area = infected tissue and presence of pus,
  • **red** area = granulation, usually a sign of healing (unless there is hypertrophy), however, red edges indicate inflammation or infection,
  • **pink** area = process of epithelisation, the final stage of healing that begins at the edges of the wound.
– In case of a sutured wound, the existence of local signs of suppuration associated with pain requires the removal of one or more sutures to avoid the infection spreading. Local signs include:
  • edges red, indurated and painful,
  • drainage of pus between the sutures, either spontaneously or when pressure is applied on either side of the wound,
  • lymphangitis,
  • sub-cutaneous crepitations around the wound indicate possible gas gangrene and needs urgent surgical attention.

In either case, if any local signs of infection are observed, look for general signs of infection (fever, chills, changes in the overall condition).

Technique for cleaning and dressing of the wound

– If possible, wash hands again, or failing that, rub them with an alcohol solution.
– Open the dressing set or box after checking the date of sterilisation and that the wrapping is intact.
– Pick up one of the sterile forceps being careful not to touch anything else.
– Pick up the second forceps with the help of the first one.
– Make a swab by folding a compress in 4 using the forceps.

The principles remain the same if the dressing is done using instruments or sterile gloves.

– **Clean sutured wound or open wound with red granulation:**
  • clean with 0.9% sodium chloride or with sterile water to remove any organic residue; work from the cleanest to the dirtiest area (use a clean swab for each stroke),
  • dab dry with a sterile compress,
  • apply antiseptic and leave for one minute,
  • re-cover a clean sutured wound with sterile compresses or an open wound with paraffin compresses; the dressing should extend a few centimeters beyond the edges of the wound,
  • keep the dressing in place with adhesive tape or a bandage.

– **Necrotic or infected open wounds:**
  After cleaning as described above, apply a detergent (plain vaseline) and remove all necrotic or infected tissue at each dressing change until the wound is clean.

– Discard any sharp materials used in an appropriate sharps container and the rest of the waste in a waste container.
– As quickly as possible, soak the instruments in disinfectant.
– Wash hands after completing care (simple hand washing).

Subsequent dressings

– Clean, sutured wound: remove the initial dressing after 5 days if the wound remains painless and odourless, and if the dressing remains clean. The decision to re-cover or to leave the wound uncovered (if it is dry) often depends on the context and local practices.
– Infected, sutured wound: remove one or more sutures and evacuate the pus. Change the dressing at least once daily.
– Open, dirty wound: daily cleaning and dressing change.
– Open granulating wound: change the dressing every 2 to 3 days, except if the granulation is hypertrophic (in this case, apply local corticosteroids).

Choice and use of antiseptics

See the table on the next page.

INDICATIONS	ANTISEPTICS	PREPARATION [1]	STORAGE	PRECAUTIONS
- Antisepsis of the skin - Wounds, burns, ulcers, abscesses	1.5% **chlorhexidine** + 15% **cetrimide** concentrate solution	20 ml of concentrate solution in 1 litre of water	1 week maximum	- Do not use to irrigate the ears or for occlusive dressings. - Do not use undiluted nor in combination with another antiseptic or soap (inactivation). - Do not bring in contact with eyes, meninges (nor natural cavities for chlorhexidine + cetrimide). - Avoid prolonged use in infants and on mucous membranes, particularly the genitals.
	5% **chlorhexidine** concentrate solution	10 ml of concentrate solution in 1 litre of water	1 week maximum	
- Infected or necrotic wounds, ulcers, abscesses	**NaDCC**	1 g of active chlorine in 1 litre of water	1 week maximum, in an opaque bottle or in brown glass (non-metallic)	- For prolonged use, protect the healthy skin around the wound with vaseline. - Do not store with oral tablets.
	tosylchloramide sodium (chloramine)	5 g in 1 litre of water (2 g in 1 litre of water for mucous membranes or for prolonged use)		
- Small superficial wounds - Fungal infections of the skin, oral and vaginal mucous membranes - Oozing dermatitis (impetigo, eczema etc.)	**gentian violet** (GV)	5 g (1 teaspoon) in 1 litre of water Mix, leave to settle, filter to eliminate sediment	1 week maximum	- Do not bring in contact with eyes. - May cause permanent pigmentation: avoid use on the face.
- Mouth washes	**polyvidone iodine 10%** (PVI)	**0.5% solution** = 1 part 10% PVI + 19 parts water	Prepare for direct use, do not store	- Do not use repeatedly: • on large areas or on mucous membranes; • on pregnant women during the 2nd and 3rd trimesters, lactating women and infants: risk of transcutaneous absorption of iodine. - Never use in combination with another antiseptic (for example, mercury derivative: risk of necrosis).
- Small wounds and burns - Antisepsis of the skin before injections or punctures - Antisepsis of the skin for an operation - Antisepsis of the hands - Fungal and viral infections of the skin		**10% solution** (pure)	In a closed opaque container	

[1] Use tap water or boiled water, filtered if necessary. Carefully wash and dry the container each time before refilling.

Treatment of a simple wound

– A simple wound is a break in the continuity of the skin limited in depth at the subcutaneous fatty tissue, that does not affect the underlying structures (muscle, bone, joints, major arteries, nerves, tendons) and without significant loss of tissue.

– The goal of treatment is to assure rapid healing of the wound without complications or sequelae. Several basic rules apply:
  • rapidly treat wounds, while maintaining the rules of asepsis and the order of the initial procedures: cleaning, exploration, dressing,
  • identify wounds that need to be sutured and those for which suturing would be harmful or dangerous,
  • immediately suture recent, clean, simple wounds (less than 6 hours old) and delay suturing contaminated wounds and/or those more than 6 hours old,
  • prevent local (abscess) or general (gas gangrene; tetanus: see *Tetanus*, page 164) infections.

Material

Instruments (Figures 1a to 1d)

– One dissecting forceps, one needle-holder, one pair of surgical scissors and one Pean or Kocher forceps are usually enough.

– One or two other artery forceps, a pair of Farabeuf retractors and a scalpel may be useful for a contused or deep wound.

Instruments to suture one wound for one patient must be packaged and sterilised together (suture box or set) to limit handling and breaks in asepsis.

Renewable supplies

– For local anaesthesia: sterile syringe and needle; **1% lidocaine** (without epinephrine)

– Sterile gloves, fenestrated sterile towel

– Absorbable and non-absorbable sutures

– Antiseptic and materials necessary for dressings

– For drainage: corrugated rubber drain or equivalent, nylon suture

Technique

– Settle the patient comfortably in an area with good lighting and ensure all the necessary material is prepared.

– Explain the procedure to the patient and ensure his co-operation.

– If the patient is a young child, arrange to have an assistant hold the child if necessary.

Initial cleaning

– Wear suitable clothing: sterile gloves for all wounds and a gown and protective glasses if there is a risk of projection from a bleeding wound.

– Start by washing the wound with ordinary soap and water, prolong the cleaning if the wound is particularly soiled.

– If necessary use a sterile brush. Cleaning with running water is preferable to cleaning by immersion.

– If the wound is infected and the patient has general signs of infection (fever, chills, changes in the overall condition) systemic antibiotic therapy may be required. Administer antibiotics at least one hour prior to starting care.

Exploration

– Wash hands and put on sterile gloves.

– Disinfect the wound and surrounding area with **10% polyvidone iodine**.

– Cover the wound with a fenestrated sterile towel.

– Local anaesthetic: infiltrate **1% lidocaine** into the edges of the wound and wait at least 2 minutes for the anaesthetic to take effect.

– Proceed carefully from the superficial to the deepest parts of the wound to explore the extent of the wound, if necessary, aided by an assistant.

– Consider the anatomical location of the wound and look for injury to any underlying structures (the clinical examination of a limb must include evaluation of sensitivity and motor functioning, as well as that of tendons in order to orient surgical exploration).
  • a wound that communicates with a fracture is an open fracture,
  • a wound close to a joint may be a joint wound,
  • a wound on the hands or feet may affect the nerves and/or tendons.

– Look for and remove any foreign bodies.

– In the event of significant pain or bleeding, the exploration must be completed in an operating room.

Wound excision

– The goal of the excision is to remove non-viable tissue which favours the proliferation of bacteria and infection.
– The wound may require little or no excision if it is clean. The excision is more extensive if the wound is bruised, irregular or extensive.
– Limit excision of the skin around the wound, particularly in facial wounds.
– Sub-cutaneous fat and tissue of doubtful viability should be generously excised in order to leave only well vascularised tissue.

Immediate suturing of a simple wound

– Immediate suturing may have serious consequences for the patient if precautions to prevent infection and promote healing are not taken.
– The decision to suture immediately can only be taken after the cleaning, exploration and satisfactory excision, and if the following conditions are met: simple wound, no more than 6 hours old with no devitalised or contused tissue (the wound may be as long as 24 hours old if on the face, scalp, upper limbs or hands).
– Bites (for local treatment see *Rabies*, page 185) and bullet, shell or mine shrapnel wounds should not be immediately sutured.

Delayed suturing of a simple wound

– Wounds that do not fill the above conditions should not be immediately sutured.
– After cleaning, exploration and excision a simple dressing is applied to the open wound.
– Further cleaning and removal of any remaining necrotic tissue is completed with daily dressing changes.
– If after 72 hours there are no signs of local infection, the wound may be sutured.

Healing by second intention of infected wounds

If the wound does not meet the conditions of cleanliness described above, the wound cannot be sutured. It will heal either spontaneously (healing by secondary intention), or will require a skin graft (once the wound is clean) if there is significant loss of tissue.

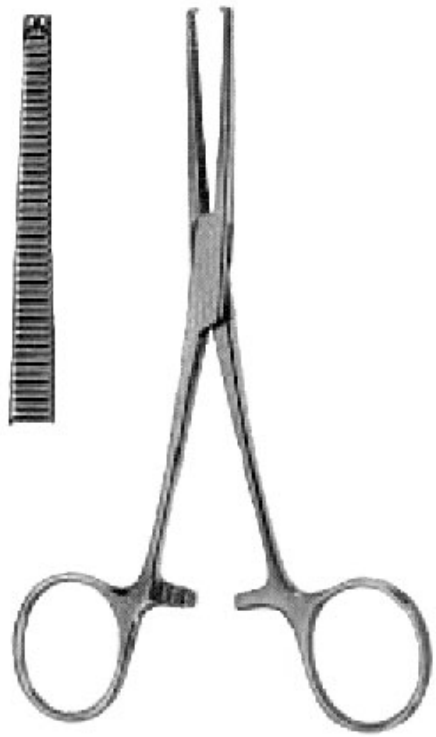


Figure 1a
Kocher forceps,
straight, toothed

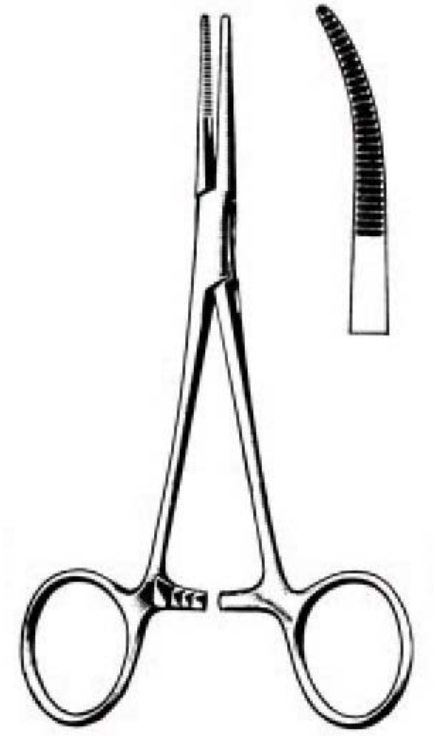


Figure 1b
Kelly forceps,
curved, non-toothed

Figure 1c
Small artery forceps,
curved, non-toothed

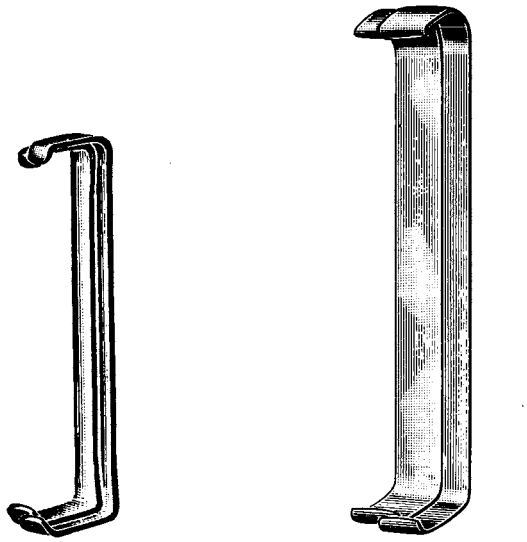


Figure 1d
Farabeuf retractors

Figures 1: *Basic instruments*

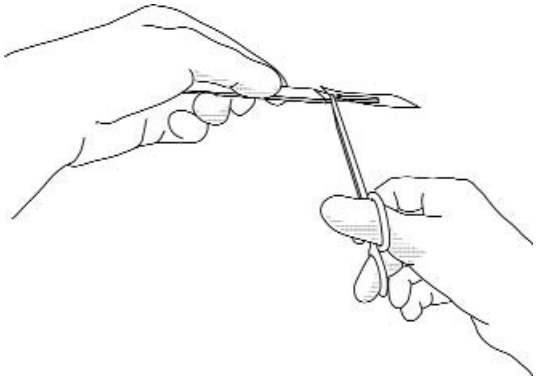


Figure 2a
Always mount a surgical blade using a needle holder.
Change the blade for each new procedure.

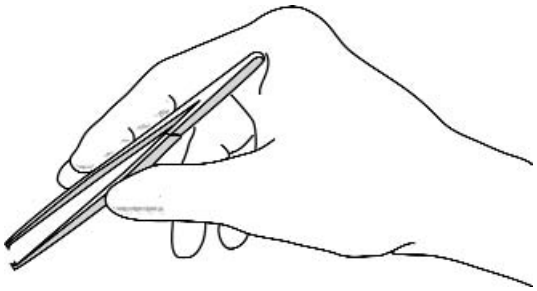


Figure 2b
Dissecting forceps should not be held in the palm of the hand, but rather between the thumb and index finger. Toothed dissecting forceps should only be used on skin.

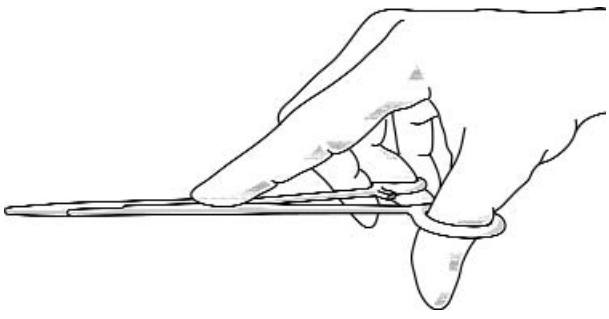


Figure 2c
Insert the thumb and the ring finger into the handle of a needle holder (or scissors), and stabilize the instrument using the index finger.

Figures 2: *How to hold instruments*

Figure 3a
Debridement of a contused, ragged wound: straightening of the wound edges with a scalpel. Be conservative in facial wounds.

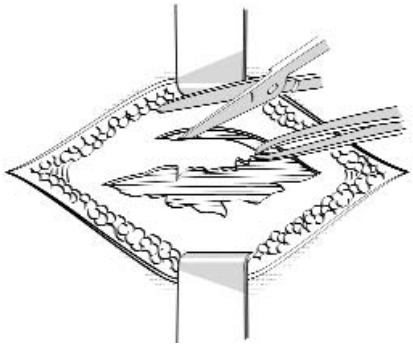


Figure 3b
Excision of edges of the aponeurosis to prevent necrosis

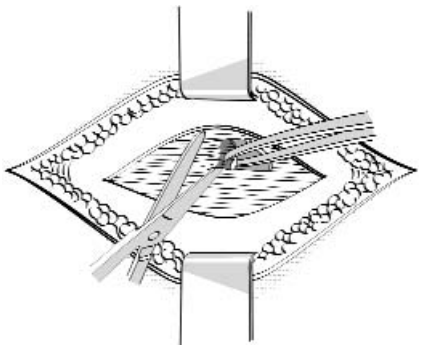


Figure 3c
Excision of contused muscle

Figures 3: *Wound debridement*
This should be done sparingly, limited to excision of severely contused or lacerated tissue that is clearly becoming necrotic.

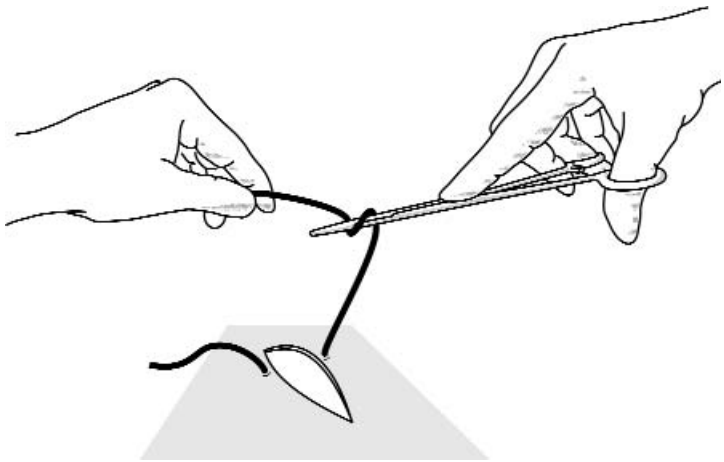


Figure 4a
Loop the suture around the needle holder in one direction and remember the direction of the loop. Grasp the loose end with the needle holder and pull it through the loop to make the first knot. Lower the knot so that it closes the wound.

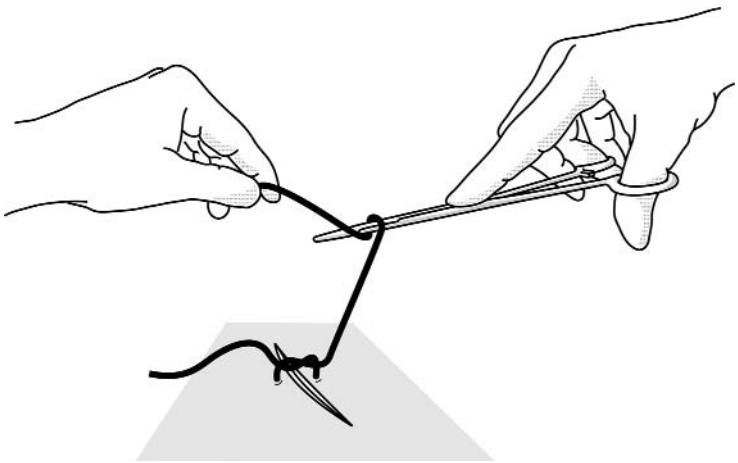


Figure 4b
The second loop should be in the opposite direction. At least 3 knots are needed to make a suture, alternating from one direction to the other.

Figure 4c
In principle the first knot lies flat.

Figure 4d
Second knot in the opposite direction.

Figures 4: *Practising making knots using forceps*

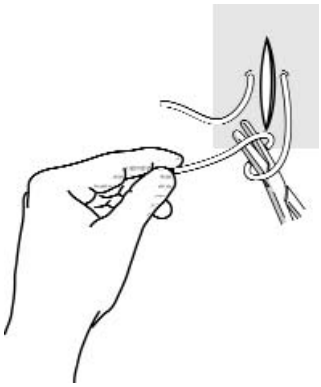


Figure 4e

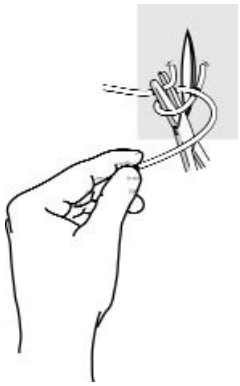


Figure 4f

Grasp the loose end with the needle holder.

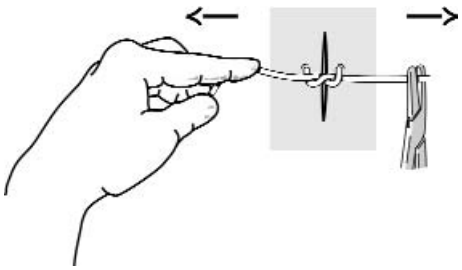


Figure 4g

First flat knot

Slide the knot towards the wound using the hand holding the loose end while holding the other end with the needle holder. Tighten the knot without causing tissue ischaemia.

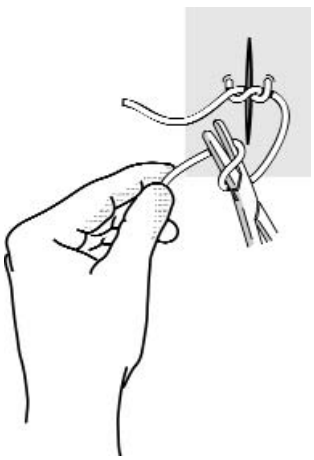


Figure 4h

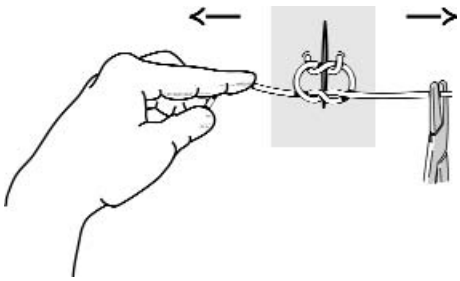


Figure 4i

Second knot in the opposite direction

Figures 4: *Practising making knots using forceps* (continued)

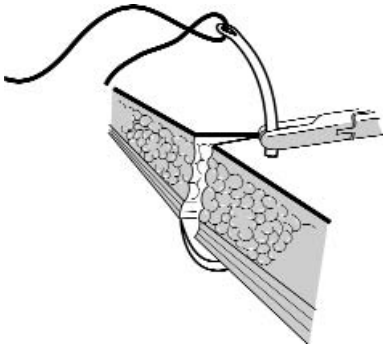


Figure 5a

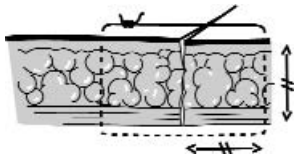


Figure 5b

The suture should be as deep as it is wide.

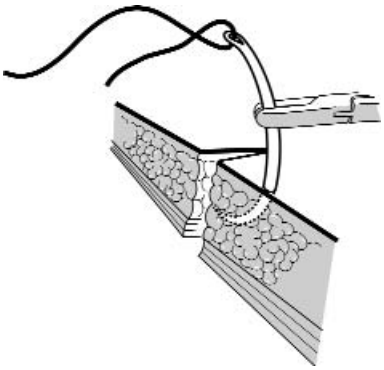


Figure 5c

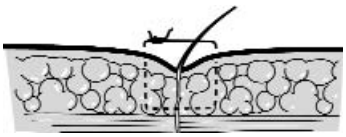


Figure 5d

The suture is too shallow, the edges are invaginated.

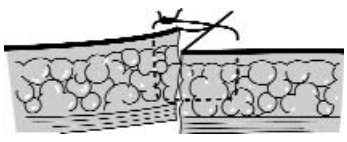


Figure 5e
Poor lining of the edges

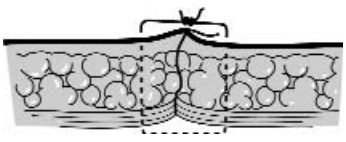


Figure 5f
Do not make the knot directly over the wound

Figures 5: *Particular problems*

Figure 6: *Closing a corner*

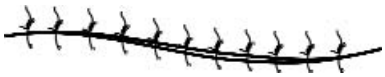


Figure 7: *Closure of the skin, simple interrupted sutures with non-absorbable sutures*

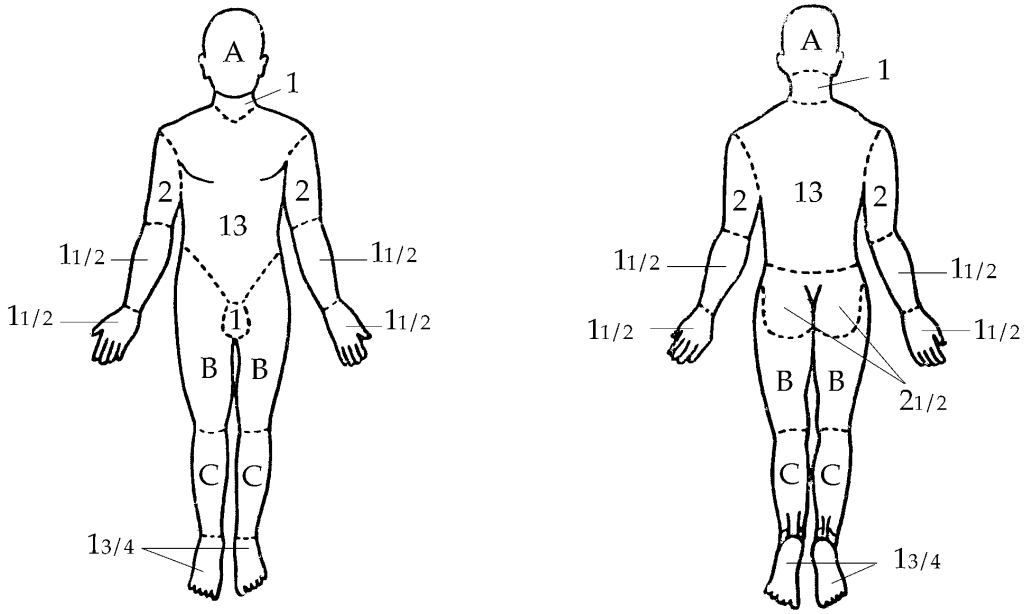
Burns

– Burns are lesions caused by heat, electricity or chemical substances. Through different mechanisms (hypovolaemic shock, septic shock), extensive burns are life threatening. Some burns are severely incapacitating.
– Burns are extremely painful, the pain is frequently underestimated and insufficiently or inadequately treated.
– As for all wounds, it is important to determine if burns are accidental or intentional (suicide attempt, aggression) in order to appropriately adapt follow-up (see *history taking*, page 10).

Evaluation of a burn patient

The severity of burns are evaluated on the basis of:
- the extent expressed in percentage of burned surface area (BSA) ;
- the depth;
- the location: burns on the face, hands, feet, folds of joints and of the perineum are functionally severe;
- the age of the patient: burns are more serious in the very young and the very old;
- the pre-existing condition: poor general condition, malnutrition etc.;
- the inhalation of smoke or toxic gas (fires in confined spaces)

– **Extent of burns**: a rapid estimation of the percentage of burned surface area (BSA) may be made using the Lund-Browder chart.



Front Back

Relative percentages of burned surface area (%BSA) as a function of age

	Age in years					
	0	**1**	**5**	**10**	**15**	**Adult**
A- 1/2 of the head	9 1/2	8 1/2	6 1/2	5 1/2	4 1/2	3 1/2
B- 1/2 of one thigh	2 3/4	3 1/4	4	4 1/4	4 1/2	4 3/4
C- 1/2 of one leg	2 1/2	2 1/2	2 3/4	3	3 1/4	3 1/2

– **Depth of burns** (only 2nd and 3rd degree burns are taken into account when calculating the percentage burned surface area):

1st degree	Skin red and painful
2nd degree superficial	Skin red and painful with blisters
2nd degree deep	Skin white with red spots, soft; diminished sensation
3rd degree	Skin black or brown or white, indurated; loss of sensation

Treatment

There are three main components to the treatment of burns:
– *Local treatment* to aid healing, prevent infection and contractures
– *Systemic treatment* to compensate for fluid losses and to prevent or treat shock
– *Treatment for pain* is essential, it relieves the patient and reduces morbidity

Immediate management: cool the burned area with tepid water (20°C). Avoid hypothermia.

Superficial or moderate burns (at dispensary level)

Burns are considered moderately severe if the patient is in good general condition; has no burns on the face, hands, perineum or on the folds of joints and the burned surface area is:
- 2nd degree: less than 10% in children and less than 15% in adults

or
- 3rd degree: less than 2%

– Clean with an antisepic that does not contain alcohol (1/4 **10% polyvidone iodine** + 3/4 **0.9% sodium chloride**).
– Apply silver **sulfadiazine**, or failing that, paraffin gauze.
– Cover with a sterile bandage.
– Treat the pain: see *pain management in burn patients*, page 261.

Note: burns isolated on the hands, face, perineum or folds of joints are severe from a functional point of view, but are not necessarily life threatening. They require careful local treatment in hospital.

Severe burns (at hospital level)

More than 10% of burned surface area in children and more than 15% in adults; very young or very old patients or patients in poor general condition.

A. Systemic treatment

– Resuscitation: the priority is to treat or prevent hypovolaemic shock:
  - Evaluate the level of shock (pulse, blood pressure), weigh the patient, insert a urinary catheter to accurately measure urine output.
  - Infusions: a good peripheral vein in healthy skin is essential as very quickly venous access becomes difficult. Perform venous cut down if necessary.

- Fluid requirements in the first 24 hours include:

  replacement fluid (compensation for fluid and electrolyte losses caused by the burns) + *maintenance fluid* (basic needs, insensible losses).

  The fluid requirements are calculated from the time the burn occurs and not from the arrival at hospital (see example below).

	Children	Adults
Replacement fluid	**Ringer Lactate** 3 ml x weight (kg) x % BSA/24 h Half this volume must be given over the first 8 hours and the other half over the following 16 hours	**Ringer Lactate** 3 ml x weight (kg) x % BSA/24 h Half this volume must be given over the first 8 hours and the other half over the following 16 hours
Maintenance fluid	1/3 **Ringer Lactate** + 2/3 **5% glucose** 4 ml/kg/hour for the first 10 kg + 2 ml/kg/hour for the next 10 kg + 1 ml/kg/hour for children over 20 kg	1/2 **Ringer Lactate** + 1/2 **5% glucose** 35 ml/kg/24 hours

  In children, an accurate estimate of the extent of burns (% BSA) is indispensable as children are very sensitive to under and overhydration.

  Example: a child weighing 20 kg with 30% burned surface area (BSA)
  - *replacement fluid*: 3 (ml) x 20 (kg) x 30 (%) = 1800 ml (900 ml to be given over the first 8 hours and the other 900 ml over the following 16 hours)
    If the child was burned at 4 pm and arrives at the hospital at 6 pm, 2 hours later, the volume of replacement fluid (900 ml) that should theoretically be given over the first 8 hours will be given over (8 hours – 2 hours) = 6 hours, from 6 pm to midnight.

  plus
  - *maintenance fluid*: 4 (ml) x 10 (kg) + 2 (ml) x 10 (kg) = 60 ml/hour (= 1440 ml over 24 hours)

  These volumes are given as a guide. Re-evaluate the fluid requirements regularly, the best indicators are urine output (which must be maintained between 0.5 and 1 ml/kg/hour) and the absence of pulmonary signs of fluid overload. Fluid (**ORS**) may be given orally (or by nasogastric tube) once the patient can tolerate this route.

- Fluid requirement in the following 24 hours:

  For children and adults: *replacement fluid*: **Ringer Lactate**, 50% of the volume calculated for the first 24 hours + *maintenance fluid*: as for the first 24 hours.

  Try to make the patient drink **ORS** frequently and in small quantities. For hydration and for caloric intake, the oral route should be used as soon as the patient is able, if necessary using a nasogastric tube.

– Treat the pain: see *pain management in burn patients*, page 261.

– Tetanus prophylaxis (see *Tetanus*, page 164).

– Place the patient in a warm (more than 28°C) and clean environment (wash hands before and after each contact).

– Do not give systematic antibiotic treatment, as this promotes selection of resistant organisms. For obvious infections, persistent fever or signs of septicaemia: systemic antibiotic treatment for at least 6 days; never give topical antibiotic treatment alone. Fever in burn patients, may not be a sign of infection, but a response by the body to the burn.

– Nutrition: increase calorie and protein intake. Feed orally or via a nasogastric tube whenever possible.
  • Add 25 kcal/kg/day + 40 kcal per % BSA to the regular diet. For information:

	Kcal content	Protein content (g)
100 g peanut paste	550	25
100 g dried pink shrimp	362	62
100 g dried fish	269	47
100 g boiled chicken	183	30
1 egg (chicken)	80	7
100 ml whole milk	79	4

  • In addition to meals, give snacks: milk + sugar + egg or 2 bars of high protein biscuits such as BP5® (250 kcal and 15 g of protein in each bar).

– Monitor and treat anaemia resulting from the destruction of red blood cells, nutritional deficiency and repeated dressing changes (**ferrous salts** PO, see *Anaemia*, page 35). In some cases (peri-operatively and in inflammatory syndrome) blood transfusion is necessary.

– Start physiotherapy as early as possible and elevate burned hands to reduce pain and swelling. Between physiotherapy sessions, prevent contractures by immobilizing the joints in the most extended position possible and not in the functional position.

B. Local treatment

Burns sterilize the tissue but rapid re-contamination is practically inevitable. Contamination may be increased by some traditional practices (applying cow dung, petrol etc.).

In the event of extensive burns and burns in children, give treatment under general anaesthesia (ketamine) in an operating room.

In all cases:

– Strict surgical asepsis: use sterile towels, gloves, instruments and dressings.

– Clean vigourously to remove dead tissue (1/4 **10% polyvidone iodine** + 3/4 **0.9% sodium chloride**).

– Remove blisters with scissors.

– Remove any blackish escars that often cover purulent areas. With a blade excise any necrotic flaps (fascia, muscle or even tendon). Then reassess the burned surface area.

– Dressings are very painful, always give analgesics prior to treatment: see *pain management in burn patients*, page 261).

- **Initial dressing**: there are two methods

  a) *Thick occlusive dressing*

  Apply **silver sulfadiazine**. Cover with a thick dressing of sterile compresses and then a loose gauze bandage.

  If this method is used, the dressing must be very thick. Covering the burn with a few compresses is insufficient and favours contamination from the ambient air through a moist dressing. Do not use paraffin dressings impregnated with antibiotics or corticosteroids nor antibiotic creams.

  Do not use circular dressings particularly on areas of flexion. On the hands, each finger must be dressed separately or preferably, thoroughly apply antiseptic to the entire hand, and place it, without dressings, in a large sterile glove, or failing that in a clean plastic bag. Change the glove or bag daily.

  b) *Open method*

  Sometimes the most convenient method is not to dress the burn at all, but rather to place the patient nude under a fine mesh mosquito net that is well tucked in. This is often the simplest method, particularly in patients with burns on the head or chest.

  If the area of necrosis enlarges, repeat debridement under general anaesthesia, in an operating room.

- **Subsequent dressings**

  Re-evaluate the burn and its evolution, look for any signs of infection.

  a) *occlusive dressings* with silver sulfadiazine: change every 2 days

  b) *open method*: monitor daily

  In the absence of spontaneous healing after 21 days, skin grafts are required. Refer to a surgical centre for split-thickness skin grafts[1]. Skin grafts should not be done too early (when it is still difficult to judge the potential for spontaneous healing) nor too late (as infection and excessive granulation may complicate the situation).

Very serious burns

The intensive protocols given above are valid for burns up to 45% BSA. The prognosis for patients with burns over 50% BSA is poor. If transfer to a burn treatment centre is not possible, treatment is largely palliative.

Pain management in burn patients

– All burns are painful and require analgesic treatment. Three types of pain are identified:
  - continual pain (experienced at rest)
  - acute pain (experienced during care: debridement, dressing changes, physiotherapy)
  - chronic pain (during the rehabilitation period)

– It is difficult to predict the intensity of pain (there is not always a correlation between the extent of the burn and the resulting pain). Regular pain assessment using self-assessment scales is indispensable for adapting analgesic doses to individual patient needs.

  Reminder: mild pain is from 0 to 3 on the self-assessment scale, moderate pain from 4 to 6 and severe pain from 6 to 10 (see *Pain*, footnote 1, page 28).

[1] For techniques of skin grafting, refer to the MSF handbook, *Minor surgical procedures in remote areas*.

– Morphine is the treatment of choice for moderate and severe pain. There have been no reports of morphine dependence in burn patients. If a patient develops tolerance, increase the dose.

Continual pain

– Mild pain: **paracetamol** PO 60 mg/kg/day in 4 divided doses
– Moderate pain: **paracetamol** PO 60 mg/kg/day in 4 divided doses + **codeine** PO 3 mg/kg/day in 4 divided doses
– Moderate to severe pain: **paracetamol** PO 60 mg/kg/day in 4 divided doses + **slow release morphine** PO 1 to 2 mg/kg/day in 2 divided doses at 12 hour intervals

Acute pain linked to treatment

Punctual analgesics are given in addition to those given for continual pain.

– Significant medical acts on patients with extensive burns: general anaesthesia in an operating room (using ketamine).
– Limited acts:
  • Moderate pain: give analgesics 60 to 90 minutes before giving care
  Combinations of **paracetamol** PO 15 mg/kg + **codeine** PO 0.6 mg/kg
  or **paracetamol** PO 15 mg/kg + **tramadol** PO 50 mg (in adults)
  are rarely effective for good pain control during care, morphine is often the only effective treatment.
  • Moderate or severe pain: assess the pain level at each dressing change to progressively adapt the morphine dose until effective pain control is achieved.
  immediate release morphine PO: start with an initial dose of 0.4 mg/kg 60 to 90 minutes before starting care. The effective dose is usually around 0.4 to 1 mg/kg, but there is no maximum dose.
  or **morphine** SC: start with an initial dose of 0.1 mg/kg 60 minutes before starting care. The effective dose is usually around 0.1 to 0.3 mg/kg but there is no maximum dose.
– In children over 1 year of age, with the exception of tramadol, these drugs may be given at the doses indicated above. For **tramadol** give: 1 mg/kg.
– In infants between 3 months and 1 year, the initial doses of morphine are one half those indicated above. For infants under 3 months, give one quarter of the doses indicated above.
– If pain control is not achieved with the treatments listed above, do not hesitate to use a general anaesthetic (ketamine).
– As a last resort (e.g. morphine is not available and there are no facilities to give general anaesthesia), adding **ketamine** IM at analgesic doses (0.5 to 1 mg/kg) reinforces the analgesic effect of the paracetamol + tramadol combination before a dressing.

Chronic pain

– The duration of this type of pain is difficult to predict. The treatment is guided by regular patient self-assessment. For this type of pain paracetamol alone or in combination with NSAID is usually sufficient.
– At this stage, patients may develop neuropathic pain. It usually responds to **carbamazepine** PO: 600 to 800 mg/day in 2 divided doses for adults and/or **amitriptyline** PO: 25 to 75 mg once daily at night for adults.
– All other associated pain (physiotherapy, mobilization) should be treated as acute pain.

Abscesses

An abscess is a collection of pus in the soft tissues most commonly due to *Staphylococcus aureus*.

During the suppurative stage, a 'ripe' abscess is red, inflamed, painful, shiny and swollen. It is usually fluctuant on palpation and may be fistulated. At this stage, the abscess cavity is inaccessible to antibiotics and surgical drainage is the only effective treatment.

During the early indurated stage, that precedes the suppurative stage medical treatment may be effective.

Treatment

Medical treatment (indurated stage)

- Antibiotic therapy:
  Children: **amoxicillin** PO: 80 mg/kg/day in 2 or 3 divided doses
  + **metronidazole** PO: 30 to 50 mg/kg/day in 3 divided doses
  Adults: **amoxicillin** PO: 4 g/day in 2 or 3 divided doses
  + **metronidazole** PO: 1.5 g/day in 3 divided doses
  or
  amoxicilline+ **clavulanic acid** (**co-amoxiclav**) PO
  Children: 80 mg/kg/day in 3 divided doses
  Adults: 4 g/day in 3 divided doses
- Adapt analgesics to the pain level (see *Pain*, page 28).
- Apply compresses soaked in 70% alcohol, 2 times/day (maximum 3 times/day to prevent burns to the skin).

If there is improvement after 48 hours: continue antibiotic treatment for 5 days to complete 7 days of treatment.
If there is no improvement after 48 hours of correct treatment: treat surgically.

Surgical drainage (suppurative stage)

Material

– Sterile scalpel handle and blade
– Sterile curved, non-toothed artery forceps (Kelly type)
– Sterile gloves
– Antiseptic (see table, page 246)
– 5 or 10 ml syringe
– Non-absorbable sutures
– Sterile corrugated drain

Anaesthesia

With the exception of paronychia, local anaesthesia of the abscess is usually impossible. General anaesthesia may be indicated, using:
ketamine IM: 10 mg/kg

Technique

– **Incision** (Figure 8a)
  - Hold the scalpel between the thumb and middle finger of the dominant hand, the index finger presses on the handle. Hold the abscess between the thumb and index finger of the other hand. The scalpel blade should be perpendicular to the skin.
  - The incision is made in a single stroke along the long axis of the abscess. The incision must be long enough for a finger to be inserted.
  - Be cautious when excising an abscess located over a blood vessel (carotid, axillary, humeral, femoral, popliteal).

– **Digital exploration** (Figure 8b)
  - Explore the cavity with the index finger, breaking down all loculi (a single cavity should remain), evacuate the pus and explore to the edges of the cavity.
  - The exploration also allows an assessment of the extent of the abscess, the depth, and location with respect to underlying structures (arterial pulsation) or any possible contact with underlying bone. In this last case, seek surgical advice.

– **Washing**

  Abundant washing of the cavity using a syringe filled with antiseptic solution.

– **Drainage** (Figure 8c)

  Insert a drain (or, failing that a gauze wick) into the base of the cavity. If possible, fix it to the edge of the incision with a single suture. The drain is withdrawn progressively and then, after 3 to 5 days removed completely.

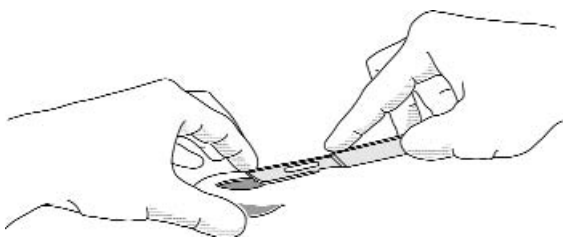


Figure 8a
Incision with a scalpel

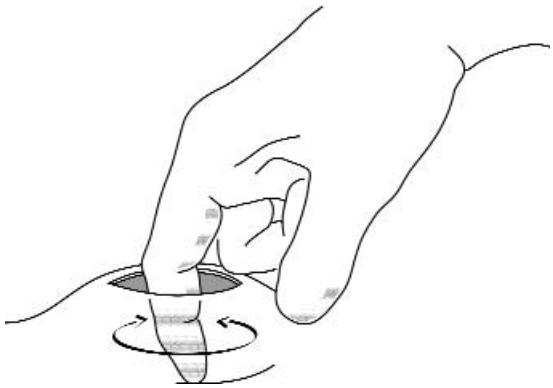


Figure 8b
Exploration of the cavity, breaking down any loculi

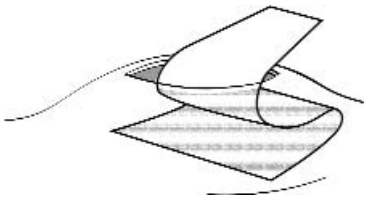


Figure 8c
Drain fixed to the skin

Figures 8: *Surgical drainage of an abscess*

Special sites

Breast abscesses

(Figures 9a to 9d)

– Breast abscesses are usually superficial, but deep ones, when they occur, are more difficult to diagnose and drain.

Medical treatment (indurated stage)

– Antibiotic treatment (see above)

– Apply a constrictive bandage, stop breast-feeding from the infected breast; express milk using a breast pump to avoid engorgement.

Surgical drainage (suppurative stage)

– Incision:
  • radial for superficial abscesses,
  • peri-areolar for abscesses near the nipple,
  • submammary for deep abscesses.
– Gentle exploration with a finger.
– Wash abundantly with a syringe filled with an antiseptic solution.
– Insert a corrugated drain.

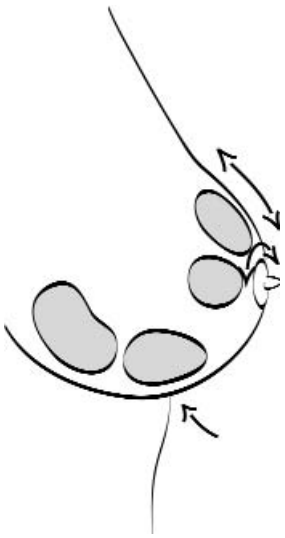


Figure 9a
Locations of breast abscesses

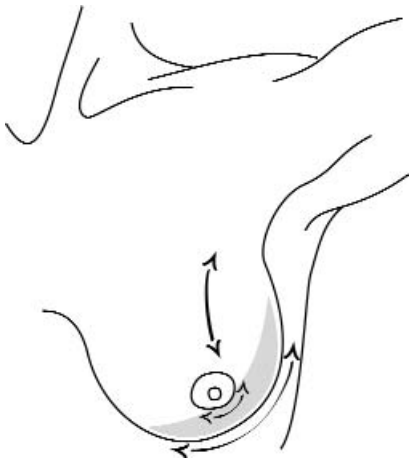


Figure 9b
Incisions: radial, peri-areolar, submammary

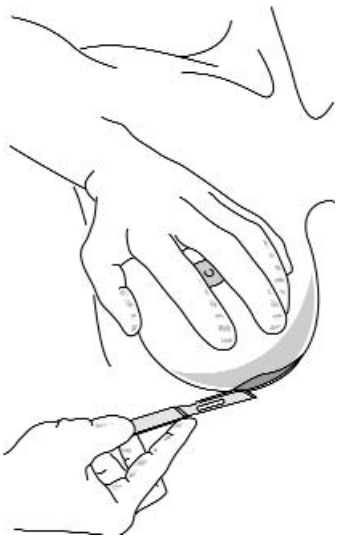


Figure 9c
Submammary incision

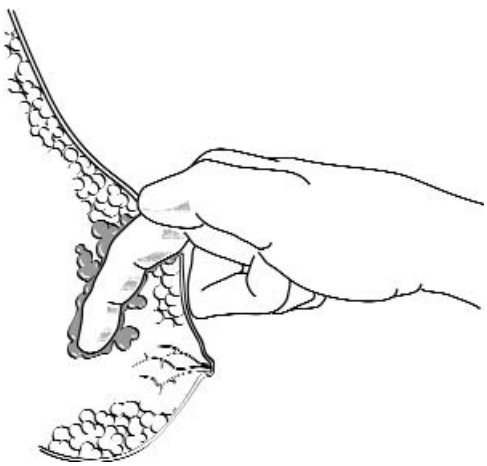


Figure 9d
Gentle exploration with a finger, breaking down any loculi

Parotid abscess

There is a risk of severing the facial nerve when incising a parotid abscess. The incision should be horizontal along the lower margin of the abscess.

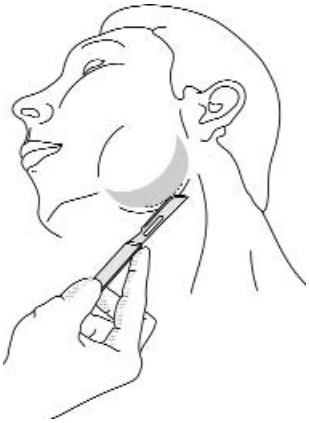


Figure 10
Incision of a parotid abscess

Pyomyositis

– Pyomyositis is an infection of the muscle, almost always due to *Staphylococcus aureus*. It most commonly affects the muscles of the limbs and torso. These infections may occur simultaneously in multiple sites.
– During the early indurated stage, while the muscle is swollen, hot and painful, medical treatment may be effective. During the suppurative stage, when the abscess has formed, surgical drainage is the only effective treatment.

Treatment

Medical treatment (indurated stage)

– Immobilise the limb.
– Antibiotic therapy as for other abscesses (see page 263).
– Adapt analgesics to the pain level (see *Pain*, page 28).
– Apply compresses soaked in 70% alcohol, 2 times/day (maximum of 3 times/day to prevent burns to the skin).

Surgical drainage (suppurative stage)

Treatment of pyomyositis is by incision following the rules for incision of abscesses described on page 264. Muscle abscesses are often deeper than other abscesses. As a result, needle aspiration with a large bore needle may be necessary to locate the abscess; it yields thick pus. Needle aspiration is insufficient treatment even if pus is evacuated.

Material and anaesthesia

As for abscesses (see pages 263 and 264).

Technique

– Generous incision along the axis of the limb, over the site of the abscess and avoiding underlying neurovascular stuctures; incise the skin, subcutaneous tissues and muscular fascia with a scalpel (Figure 11a).
– Dissect the muscle fibres with non-toothed forceps (Kelly type) or round tipped scissors. Insert the instrument into the muscle until the purulent cavity is reached. During insertion, keep the instrument closed and perpendicular to the muscle fibres. Withdraw gently with the scissors or forceps slightly open, keeping instrument perpendicular to the fibres (Figure 11b).
– Use a forefinger to explore the cavity, break down any loculi and evacuate the pus (Figure 11c).
– Wash abundantly with antiseptic solution.
– Insert a large drain.
– Fix the drain to the edge of the wound using a single suture. Remove the drain on about the 5th day (Figure 11d).

Special site

Myositis of the psoas muscle: if the abscess is on the right side, the clinical signs are the same as for appendicitis with pain in the right iliac area. Transfer the patient to a surgical centre.

Figure 11a
Long incision

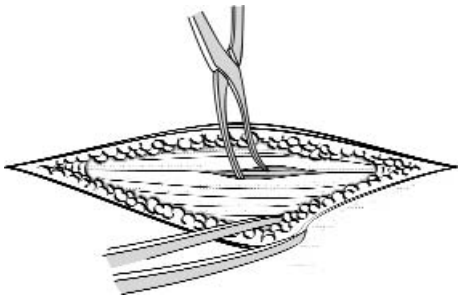


Figure 11b
Dissection of the muscle using Kelly forceps, insert closed then withdraw with the instrument slightly open

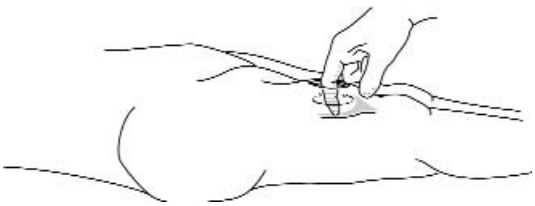


Figure 11c
Exploration and evacuation of pus with the finger

Figure 11d
Drain fixed to the skin

Figures 11: *Surgical drainage of a pyomyositis*

Leg ulcers

– Leg ulcers are chronic losses of cutaneous tissue. They are common in tropical regions, resulting from varied aetiologies:
  • vascular: venous and/or arterial insufficiency
  • bacterial: leprosy, Buruli ulcer (*Mycobacterium ulcerans*), phagedenic ulcer, yaws, syphilis
  • parasitic: dracunculiasis (Guinea-worm disease), leishmaniasis
  • metabolic: diabetes
  • traumatic: trauma is often a precipitating factor combined with another underlying cause
– The history of the disease and a complete clinical examination (paying particular attention to the neurological examination to determine if there is a peripheral neuropathy caused by leprosy or diabetes) usually leads to an aetiological diagnosis.
– All ulcers may become complicated with either local or regional secondary infections (abscess, lymphadenopathy, adenitis, osteomyelitis, erysipela, pyodermitis), generalised infection (septicaemia), tetanus and after many years of evolution, skin cancer.

Daily local treatment

– Bathe the leg for 10 to 15 minutes in **NaDCC** or **chloramine** (see preparation page 246) and rinse in boiled water.
– Remove any necrotic (black) and fibrinous (yellowish) tissue using compresses or excise the tissue with a scalpel.
– Apply:
  • to a clean ulcer, with little discharge: **10% polyvidone iodine** and vaseline
  • to a dirty ulcer, with little discharge: **silver sulfadiazine**
  • to an oozing ulcer: **10% polyvidone iodine** alone
  • multiple or extensive ulcers, particularly in children: **gentian violet** for oozing ulcers and **silver sulfadiazine** for ulcers with no discharge. Do not apply polyvidone iodine as there is a risk of transcutaneous iodine absorption.
– Cover with a dry sterile dressing.

Systemic treatment

– Treatment with analgesics in the event of pain: adapt the level and dosage to the individual (see *Pain*, page 28).
– Give systemic antibiotics in case of:
  • secondary infection (see *Bacterial skin infections*, page 100).

- phagedenic ulcer (in the early stages, antibiotics may be useful. They are often ineffective in the chronic stages):

  benzylpenicillin procaine + benzylpenicillin IM (if necessary give half the dose in each buttock)
  Children: 100 000 IU/kg once daily for 7 days
  Adults: 4 MIU once daily for 7 days

  If the patient is allergic to penicillin:
  erythromycin PO
  Children: 50 mg/kg/day in 2 divided doses
  Adults: 2 g/day in 2 divided doses
  or
  doxycycline PO (except in children under 8 years and pregnant or lactating women)
  Children over 8 years: 4 mg/kg once daily
  Adults: 200 mg once daily
  or
  metronidazole PO
  Children: 30 mg/kg/day in 3 divided doses
  Adults: 1.5 g/day in 3 divided doses

  If after 7 days the choosen antibiotic shows to be effective, continue for as long as needed, treatment duration varies according to the clinical evolution.
  For patients treated with penicillin, change to oral treatment after 7 days by using **phenoxymethylpenicillin** PO
  Children from 1 to 5 years: 500 mg/day in 4 divided doses
  Children from 6 to 12 years: 1 g/day in 4 divided doses
  Adult: 2 g/day in 4 divided doses

– Treat the cause

– Complementary therapy:
  - Elevate the legs in cases of venous and/or lymphatic insufficiency
  - Give tetanus prophylaxis if appropriate (see *Tetanus*, page 164)
  - Skin graft[1] if the ulcer is extensive, clean, red and flat. Skin grafts are often necessary after surgical excision to heal phagedenic and Buruli ulcers.

[1] For techniques of skin grafting, refer to the MSF handbook, *Minor surgical procedures in remote areas*.

Sting and venomous bites

Snake bites

– In 50% of bites there is no envenomation. In the event that venom is injected, the severity of the envenomation depends on the species, the quantity of venom injected, the site (bites on the head and neck are the most dangerous) and the weight, general condition and age of the individual (more serious in children).

– In practice it is rare that the snake involved is identified. Observation of the clinical signs may orient aetiological diagnosis and treatment. Two major syndromes are identified:
  • neurological disorders that evolve towards coma with paralysis of the respiratory muscles, are commonly signs of envenomation by an elapid (cobra, mamba etc.);
  • extensive local lesions (intense pain, inflammation with oedema and necrosis) and coagulation disorders are commonly signs of envenomation by a viperid or a crotalid (rattle snake).

  Clinical signs and treatment in the event of *bites* and *envenomation* are described in the following page.

– Early diagnosis and monitoring of coagulation disorders is based on whole blood clotting tests performed in a dry tube (at the patient's arrival and then every 4 hours for the first day).
  Take 2 to 5 ml of whole blood, wait 30 minutes and examine the tube:
  • complete coagulation: no haemorrhagic syndrome;
  • incomplete coagulation or no coagulation: haemorrhagic syndrome[1].

  If coagulation is abnormal, continue to monitor once daily until coagulation returns to normal.

– Aetiological treatment is based on the administration of snake antivenom serum **only if there are clear clinical signs of envenomation or if abnormal coagulation is observed on blood clotting test in a dry tube**.
  Antivenom sera are effective, but are rarely available (verify local availability) and are difficult to store.
  Antivenom serum should be administered as early as possible: by IV infusion (in 0.9% sodium chloride) if using a poorly purified serum; or by direct, slow IV in the event of severe envenomation if the serum is known to be well purified.

⚠ For all patients, be prepared for an anaphylactic reaction which, despite its potential effects (see *anaphylactic shock*, page 18 and 19), is usually more easily controlled than coagulation disorders or serious neurological disorders.

  If the symptoms of envenomation persist, repeat antivenom serum administration after 2 or 3 hours.

– In asymptomatic patients (bites without signs of envenomation and with normal coagulation), medical monitoring must continue for at least 6 hours (12 hours preferred).

[1] There can be a considerable delay between the decrease in coagulation factors (less than 30 minutes after the bite) and the first signs of bleeding (other than local bleeding at the site of the bite and/or the development of sero-sanguinous blisters), which may appear only 3 hours after the bite.

Clinical signs and treatment

Time since bite	Clinical signs	Possible aggressor	Treatment
Bite			
0	Fang marks Burning pain at the site of bite	?	Strict rest, immobilisation of the limb with a splint to slow the diffusion of venom[2] Careful disinfection of the wound Observe for clinical signs of envenomation A the dispensary level, prepare to evacuate the patient to a referral centre
Envenomation			
10-30 minutes	Hypotension, myosis, hypersalivation, excessive sweating, dysphagia, dyspnoea Local paraesthesia, paresia	Elapids	Insert a peripheral IV line IV **antivenom serum** as soon as possible
	Inflammatory syndrome: intense pain, extensive regional oedema	Viperids Crotalids	Insert a peripheral IV line IV **antivenom serum** as soon as possible Local or regional analgesics as necessary Depending on the extent of the oedema: IV or PO[3] anti-inflammatories
30 minutes-5 hours	Cobra syndrome: bilateral ptosis, trismus, respiratory paralysis Shock	Elapids	Intubation and assisted ventilation See *Shock*, page 17
30 minutes-48 hours	Haemorrhagic syndome: epistaxis, purpura, haemolysis or disseminated intravascular coagulation Shock	Viperids Crotalids	Monitor coagulation (blood clotting test in a dry tube) Transfuse fresh blood in the event of severe anaemia (screen for HIV, hepatitis B and C etc.) See *Shock*, page 17
6 hours or more	No signs or changes in coagulation (non-venomous snakes or snake bite without envenomation	?	Reassure the patient and send him home
	Necrosis		Remove blisters, clean, daily dressings Surgical intervention for necrosis, depending on the extent, may only be possible after the lesions stabilise (minimum 15 days)

2 Tourniquets, incision-suction and cauterisation are ineffective and may be dangerous.

3 Do not use acetylsalicylic acid (aspirin).

For all patients:
– Antibiotic treatment (**amoxicillin** PO: 50 mg/kg/day in 2 or 3 divided doses for at least 5 days).
– Tetanus prophylaxis (see *Tetanus*, page 164).

Scorpion stings

– In most cases, the sting causes local effects including: pain, oedema, erythema
Treatment is limited to strict rest +++, local disinfection, administration of acetylsalicylic acid (see *Pain*, page 28) and tetanus prophylaxis (see *Tetanus*, page 164).
In patients with significant pain, infiltrate the area around the sting with local anaesthetic (1% **lidocaine**). Observe for 12 hours.
– General signs appear in cases of severe envenomation: hypertension, extreme sweating, increased saliva production, hyperthermia, vomiting, diarrhoea, muscle pain, respiratory problems, seizures; rarely, shock.
– Aetiological treatment:
The use of scorpion antivenom sera is controversial (most of them are not very effective, they may be poorly tolerated due to insufficient purification).
In practice, in countries where scorpion envenomations are severe (North Africa, the Middle East, Central America and Amazonia), verify local availability of antivenom sera and follow national protocols.
The criteria for administration are the severity of the envenomation, the age of the patient (more severe in children) and the time elapsed since the sting. This should not exceed 2 to 3 hours. If the time elapsed is more than 2 or 3 hours, the benefit of antivenom serum is poor in comparison with the risk of anaphylaxis (in contrast to envenomation by snakes).
– Symptomatic treatment is based on:
  • prevention of dehydration in patients with vomiting, diarrhoea or excessive sweating (oral rehydration salts), particularly in children.
  • 10% **calcium gluconate** slow IV (children: 5 ml/injection, adults: 10 ml/injection; over 10 to 20 minutes) in patients with muscle pain.
  • **diazepam** may be used with caution in the event of seizures, the risk of respiratory depression is increased in envenomated patients (see *Seizures*, page 23).

Spider bites

– Treatment is usually limited to local disinfection, complete rest, administration of acetylsalicylic acid PO (see *Pain*, page 28) and tetanus prophylaxis (see *Tetanus*, page 164).

– Severe envenomations are rare. There are two main clinical syndromes:
  • neurotoxic syndrome (black widow spider): severe muscle pain, tachycardia, hypertension, nausea, vomiting, headache, excessive sweating. The signs develop for 24 hours and then resolve spontaneously over a few days.
  • necrotic syndrome (recluse spider): local tissue lesions, possible necrosis and ulceration; mild general signs (fever, chills, malaise and vomiting) which usually resolve over a few days. If present, haemolysis may sometimes be life threatening.

  As well as the general measures listed above, treatment includes administration of 10% **calcium gluconate** by slow IV (children: 5 ml/injection, adults: 10 ml/injection; over 10 to 20 minutes) in the event of muscle spasms and an antibiotic in patients with necrosis.[4]

Hymenoptera (honeybees, wasps and hornets) stings

– Local care: remove the embedded sting (bee), clean with soap and water, and if very itchy, apply **calamine** lotion.

– Analgesics if necessary (**paracetamol** PO)

– In the event of an anaphylactic reaction (extensive pruritus or urticaria, hypotension, bronchospasm or laryngeal oedema):
  • insert an IV line (risk of shock)
  • **epinephrine** (**adrenaline**) IM
    Infants and children: 0.01 mg/kg/injection
    Adults: 0.25 to 0.75 mg/injection
    If the patient is not improving, repeat the injection every 5 minutes
  • depending on the severity, give **hydrocortisone** IV or IM to prevent short term relapse:
    Children 2 to 4 mg/kg/injection
    Adults: 100 to 500 mg/injection

– In the event of anaphylactic shock, see *Shock*, page 19.

[4] Incision and debridement of dead tissue are not recommended (they are not useful and may impair healing).

Dental infections

Infection arising as a secondary complication of an inflammation of the dental pulp. The severity and the treatment of dental infections depend on their evolution: localised to the infected tooth, extended to adjacent anatomical structures or diffuse infections.

Clinical signs and treatment

Infection localised to a tooth and its surroundings (acute dental abscess)

– Intense and continuous pain.

– On examination: swelling limited to the gum surrounding the infected tooth. Purulent exudate may be present draining either through the root canal, or through the periodontal ligament (loosening the tooth) or through a gingival fistula. There are no signs of the infection extending to adjacent anatomical structures nor general signs of infection.

– Treatment:
  • Treatment is only surgical (the source of infection is inaccessible to antibiotics): root canal therapy (disinfection of the root canal) if possible or extraction of the tooth.[1]
  • Pain: **paracetamol** or **ibuprofen** PO (see *Pain*, page 28).

Infections extending to adjacent anatomical structures (acute dento-alveolar abscess)

Local spreading of an acute dental abscess into the surrounding bone and tissue.

– Painful gingival and buccal swelling with warm and tender skin, developing into a ripe abscess: intense pain, with trismus, particularly if the infection is in a posterior tooth, presence of general signs (fever, fatigue, cervical lymphadenopathy).

– In patients with acute gangrenous cellulitis (crepitations on palpation), treat as an infection extending into the cervico-facial tissues (following page).

– Treatment:
  • First surgical: incision and drainage of the pus or extraction of the tooth.[1]
  • Then antibiotic treatment for 5 days following the procedure: **amoxicillin** PO
    Children: 50 mg/kg/day in 2 divided doses
    Adults: 2 g/day in 2 divided doses
    Notes:
    If the dental procedure has to be delayed (local anaesthesia not possible due to inflammation, significant trismus), start with antibiotic treatment, but the dental procedure must be completed in the following days.
    If there is no improvement within 48 to 72 hours after the dental procedure, do not change antibiotic, but start a new procedure on the tooth.
  • Pain: **paracetamol** or **ibuprofen** PO (see *Pain*, page 28).

[1] For techniques of dental extraction, see the MSF handbook, *Minor surgical procedures in remote areas*.

Infections extending into the cervico-facial tissues

– Extremely serious cellulitis, with rapidly spreading cervical or facial tissue necrosis and signs of septicaemia.

– Treatment:
  • treatment in an intensive care unit.
  • high dose antibiotic treatment (see *antibiotic treatment of septic shock,* page 20).
  • extraction of the tooth.[2]

2 For techniques of dental extraction, see the MSF handbook, *Minor surgical procedures in remote areas*.

CHAPTER 11

Other conditions

Hypertension

– **Adult essential hypertension** is defined as a systolic pressure greater than or equal to 160 mmHg and/or a diastolic pressure greater than or equal to 90 mmHg.
The elevation must be constant: blood pressure must be measured twice at rest during three consecutive consultations over a period of three months.
Hypertension is a risk factor for stroke (cerebrovascular accident or CVA), heart failure, renal failure and atherosclerosis.

– **Hypertension in pregnancy** is defined as a systolic pressure greater than or equal to 140 mmHg or a diastolic pressure greater than or equal to 90 mmHg (with the patient seated and at rest). It may be isolated or associated with proteinuria or oedema in the case of pre-eclampsia.
Hypertension in pregnancy is a risk factor for eclampsia, placental abruption and premature delivery.

Treatment of adult essential hypertension

– In patients with medication-induced hypertension (oral contraceptives, hydrocortisone, MAO inhibitors, NSAID etc.), stop or change the treatment.
– Otherwise, start with diet and exercise modification: reduce salt intake, lose any excess weight, and increase the level of physical activity.
– If despite these measures the blood pressure remains consistently above 160/100 mmHg (or 140/80 mmHg for a diabetic patient or following a CVA), an anti-hypertensive medication may be added.
– Start with monotherapy. The optimal dose depends on the patient; reduce by half the initial dose for elderly patients.
– The three classes of anti-hypertensives used as initial therapy[1] are the thiazide diuretics (hydrochlorothiazide), the beta-blockers (atenolol), and the angiotensin converting enzyme (ACE) inhibitors (enalapril, captopril). For information:

Indications	Initial treatment
Uncomplicated hypertension	thiazide diuretic or beta-blocker
Patient over 65 years	thiazide diuretic
Diabetic patient	ACE inhibitor or beta-blocker
Complicated hypertension:	
Following a CVA	thiazide diuretic
Following a myocardial infarction	beta-blocker
Heart failure	ACE inhibitor
Renal failure	ACE inhibitor

– The treatment must be taken regularly. Abrupt cessation of beta-blocker treatment may cause adverse effects (malaise, angina)[2]. Only prescribe a treatment if it can be followed by a patient under regular surveillance.

[1] The diuretics, beta-blockers, and ACE inhibitors have shown their capacity to prevent the complications of hypertension. They are preferred to other anti-hypertensives, notably calcium channel blockers (nifedipine).

[2] Furthermore, a sudden stop to treatment with centrally acting anti-hypertensives (e.g. methyldopa, clonidine) may cause a rebound effect.

The objective is to reduce the blood pressure to below 160/90 mmHg (or 140/90 mmHg for diabetic patients) while producing the fewest possible adverse effects.
For uncomplicated hypertension:
- Start with a thiazide diuretic: **hydrochlorothiazide** PO 25 to 50 mg once daily.
- If the patient is not improving after 4 weeks, or if treatment is not tolerated: check compliance, and then if there are no contra-indications (asthma, uncontrolled heart failure), change to a beta-blocker: **atenolol** PO 50 to 100 mg once daily.
- If the treatment is still of little or no benefit: recheck compliance, and then consider combined therapy (thiazide diuretic + beta-blocker or thiazide diuretic + ACE inhibitor).

Note: if enalapril[3] is used as monotherapy (see table of indications), start with 5 mg once daily, then increase the dose every 1 to 2 weeks, according to blood pressure, up to 10 to 40 mg once daily or in 2 divided doses. In elderly patients, patients taking a diuretic or patients with renal impairment: start with 2.5 mg once daily as there is a risk of hypotension and/or acute renal impairment.

Specific case: treatment of hypertensive crisis

An occasional rise in blood pressure usually passes without problems, whereas aggressive treatment, notably with sublingual nifedipine, can have serious consequences (syncope, or myocardial, cerebral, or renal ischaemia).

– *In patients with hypertensive crisis*:
  - Reassure the patient and place him at rest.
  - If despite these measures the blood pressure remains elevated, the addition of **furosemide** PO (20 mg once daily) may, in certain cases, gradually reduce the blood pressure in 24 to 48 hours and prevent eventual complications.
– *In patients with hypertensive crisis complicated by acute pulmonary oedema*:
  - The objective is not to normalise the blood pressure at any price, but to treat the pulmonary oedema (see page 284).
  - Start or adjust the baseline treatment once the crisis is resolved.

Treatment of hypertension in pregnancy

During pregnancy, regularly monitor: blood pressure, weight, oedema, proteinuria, and fundal height.

– If the diastolic pressure is less than 110 mmHg: rest, monitoring, and a normal sodium and normal calorie diet.
– Start anti-hypertensive treatment when the diastolic pressure reaches 110 mmHg. Treatment is aimed only at preventing maternal complications of severe hypertension.
– During treatment, the diastolic pressure should always be maintained above 90 mmHg: lowering the pressure too aggressively carries the risk of foetal death from placental hypoperfusion.
– As the definitive treatment for hypertension is delivery, the mother must be transferred to a hospital for labour to be induced.
– Diuretics and angiotensin converting enzyme inhibitors (captopril, enalapril etc.) are contra-indicated in the treatment of hypertension in pregnancy.

[3] **Enalapril** (10 to 40 mg once daily or in 2 divided doses) may be replaced by **captopril** (100 mg/day in 2 divided doses).

– **In patients with isolated hypertension or moderate pre-eclampsia**
  • Before 37 weeks of amenorrhoea: rest and observe as above.
  • After 37 weeks, if there is intrauterine growth retardation: delivery, vaginally or by caesarean section depending on the cervical assessment. If there is no growth retardation, induce delivery as soon as the cervix is favourable.
  • If the diastolic pressure is greater than 110 mmHg: methyldopa PO or atenolol PO, or failing that, nifedipine PO as below.

– **In patients with severe pre-eclampsia** (hypertension + massive proteinuria + significant oedema)
  • Urgent delivery within 24 hours, vaginally or by caesarean section depending on the cervical assessment.
  • Try to reduce the risk of eclampsia prior to delivery:
    magnesium sulphate by IV infusion: 4 g diluted in 0.9% sodium chloride over 15 to 20 minutes, then 1 g/hour for 24 hours following delivery or the last seizure.
    Monitor urine output. Stop the treatment if urinary output is less than 30 ml/hour or 100 ml/4 hours.
    ⚠ Before each injection, verify the concentration written on the ampoules: there is a risk of potentially fatal overdose. Always have calcium gluconate ready to reverse the effects of magnesium sulfate in the event of toxicity.
    Monitor patellar tendon reflexes every 15 minutes during the infusion. If the patient has malaise, drowsiness, difficulty speaking, or loss of patellar reflexes: stop the magnesium sulfate infusion and immediately give 1 g of **calcium gluconate** by slow, direct IV (over 5 to 10 minutes).
  • If the diastolic pressure is greater than 110 mmHg:
    methyldopa PO: initially 500 to 750 mg/day in 2 to 3 divided doses for 2 days, then increase gradually if necessary by 250 mg every 2 to 3 days, until the optimal dose is reached, usually 1,5 g/day. Do not exceed 3 g/day.
    or **atenolol** PO: 50 to 100 mg once daily in the morning
    or, failing that: **nifedipine** PO (immediate-release capsule): 10 mg to be repeated every 15 minutes as long as the diastolic BP remains above 110 mmHg (maximum 40 mg). The diastolic BP must not drop below 90 mmHg. The sublingual route is strongly discouraged (risk of sudden fall in blood pressure, placental hypoperfusion and foetal death).
    Continue with **nifedipine** PO (prolonged-release tablet): 20 to 60 mg/day in 1 or 2 doses depending on the preparation used, until BP normalises.
    Do not stop treatment abruptly, reduce doses gradually.
    When oral treatment is not possible:
    hydralazine by slow IV infusion (ampoule of 20 mg/ml, 1 ml): 4 ampoules in 500 ml of 0.9% sodium chloride (do not use glucose solution). Increase the rate progressively to 30 drops/minute. Adjust the rate of the infusion depending on the blood pressure without allowing the diastolic pressure to drop below 90 mmHg.

– **In patients with eclampsia**
  • Urgent delivery within 12 hours, vaginally or by caesarean section depending on the cervical assessment and of the condition of the foetus.
  • Treatment of seizures: **magnesium sulfate** IV infusion (see *seizures during pregnancy*, page 25).
  • Nursing, hydration +++ (1 litre of Ringer Lactate rapidly), monitor urinary output (insert an urinary catheter); oxygen (4 to 6 litres/minute).
  • Anti-hypertensive treatment only if the diastolic pressure is greater than 110 mmHg as in pre-eclampsia (see above).
  • Postpartum: continue the magnesium sulfate for 24 hours following delivery or the last seizure, continue anti-hypertensive treatment if the diastolic pressure remains above 110 mmHg, monitor urinary output.

Heart failure

Heart failure is defined as the inability of the myocardium to provide normal haemodynamic function.
Left-sided heart failure (often secondary to coronary or valvular heart disease, and/or arterial hypertension) is the most common form.
There are two types:
– chronic heart failure with insidious onset
– acute heart failure, which is life threatening, presents either as acute pulmonary oedema or as cardiogenic shock.

Clinical signs

– **Left-sided heart failure** secondary to left ventricular failure:
  • fatigue and/or progressive dyspnoea, occurs on exertion and then at rest (accentuated by the decubitus position, preventing the patient from lying down)
  • acute pulmonary oedema: acute dyspnoea, laryngeal crackles, cough, frothy sputum, anxiety, pallor, varied degrees of cyanosis, feeble rapid pulse, wet rales in both lung fields, muffled heart sounds, often with cardiac gallop
– **Right-sided heart failure** secondary to right ventricular failure:
  • oedema of the lower limbs, jugular venous distention, hepatomegaly, hepatojugular reflux
  • ascites in advanced stages
  Rarely isolated, this is often a consequence of left ventricular failure.
– **Global heart failure** secondary to failure of both ventricles:
  • left and right-sided signs. Signs of right ventricular failure are often the most prominent.

Treatment of acute heart failure (acute pulmonary oedema and cardiogenic shock)

– **First case: blood pressure is maintained**
  • Place the patient in the semi-reclined position with legs lowered.
  • Give high-flow oxygen
  • Reduce pulmonary pressure with combination furosemide + morphine + rapidly-acting nitrate derivatives:
  furosemide IV (onset of action in 5 minutes and peak effect in 30 minutes): 40 to 80 mg/injection, to be repeated every 2 hours according to clinical evolution. Monitor blood pressure and urine output.
  + **morphine**: according to severity 3 to 5 mg by slow IV injection or 5 to 10 mg by SC injection
  + **glyceryl trinitrate** sublingual: 0.25 to 0.5 mg. Monitor blood pressure. Repeat after 30 minutes if necessary, only if the systolic blood pressure remains above 100 mmHg.
  • In certain serious cases, if none of these drugs are available, bleed off 300 to 500 ml of blood over 5 to 10 minutes from the basilic vein (in the elbow fold) and monitor the blood pressure.

– **Second case: blood pressure collapsed**, see *cardiogenic shock*, page 21.

Treatment of chronic heart failure

The objective is to improve the prognosis and quality of life.

– Dietary modification: reduce salt intake to limit fluid retention, normal fluid intake (except in the case of anasarca: 750 ml/24 hours).

– **Treatment of fluid retention**

- Initial therapy: **furosemide** PO
  During congestive episodes: 40 to 120 mg once daily. When the congestive episode is controlled, reduce the dose to 20 mg once daily.
- The dose can be increased (up to 240 mg/day). If these doses are still ineffective, adding **hydrochlorothiazide** PO (25 to 50 mg/day for several days) may be considered.
- In case of treatment failure and in the absence of severe renal impairment, furosemide may be combined with **spironolactone** PO: 25 mg once daily.
- If present, drainage of pleural effusions by needle aspiration.

Note: the risks of administering diuretics include: dehydration, hypotension, hypo- or hyperkalaemia, hyponatremia, and renal impairment. Clinical monitoring (hydration, blood pressure) and if possible metabolic monitoring (serum electrolytes and creatinine), should be done regularly, especially if giving high doses or in elderly patients.

– **Baseline treatment**

- Angiotensin converting enzyme (ACE) inhibitors are the first line treatment. Start with low doses, especially in patients with low blood pressure, renal impairment, hyponatremia, or concurrent diuretic treatment.

  enalapril PO[1]: 5 mg once daily for the first week, then double the dose each week until the effective dose is reached, usually around 10 to 40 mg once daily or in 2 divided doses. Increases in the dose are made while monitoring the patient's blood pressure (the systolic pressure should remain above 90 mmHg) and blood chemistry (there is a risk of hyperkalemia[2] and renal impairment).

  In patients treated with diuretics, reduce the dose of the diuretic if possible while introducing ACE inhibitors.
  If the patient is taking high doses of diuretics, reduce the initial dose of enalapril to half (risk of symptomatic hypotension).
  Do not combine ACE inhibitors and spironolactone (risk of severe hyperkalemia).
- Digitalis glycosides are only indicated in patients with proven atrial fibrillation (ECG).
  If there are no contra-indications (bradycardia, unidentified rhythm disturbances):
  digoxine PO: 0.5 to 1 mg in 3 or 4 divided doses on the first day, then 0.25 mg once daily
  The therapeutic dose is close to the toxic dose. Do not exceed the indicated dose and give half the dose, or even a quarter (on alternate days) to elderly or malnourished patients and to patients with renal impairment.

1 Enalapril may be replaced by **captopril**: start with 6.25 mg three times daily for the first week, the effective dose is usually around 50 mg twice daily. The method of increasing the dose, the precautions, and patient monitoring are the same as for enalapril.

2 Moderate hyperkalaemia is frequent, but of no concern if it remains below 5.5 mEq/l.

- With global and left-sided heart failure, the nitrate derivatives may be used in case of signs of intolerance to ACE inhibitors (chronic cough, renal impairment, severe hypotension).
  isosorbide dinitrate PO: start with 10 to 15 mg/day in 2 or 3 divided doses and increase to the effective dose, usually around 15 to 60 mg/day. Very high doses (up to 240 mg/day) may be necessary.
- Whatever the treatment prescribed, monitoring should be regular: checking clinical improvement and treatment tolerance:
  - clinical monitoring consists of evaluating the weight, blood pressure, pulse (rhythm disturbances) and the progress of signs (dyspnoea, oedema, etc.);
  - laboratory monitoring is adapted according to the treatment.

Treatment of specific aetiologies

Hypertension (see page 281); *anaemia* (see page 34)

Cardiovascular or "wet" beriberi from vitamin B1 deficiency

thiamine IM or IV
Children: 25 to 50 mg/day for several days
Adults: 50 to 100 mg/day for several days
Then change to oral treatment with **thiamine** PO
Children and adults: 3 to 5 mg once daily for 4 to 6 weeks

Acute rheumatic fever

– Antibiotic treatment
  benzathine benzylpnicillin IM
  Children under 30 kg: 600 000 IU as a single dose
  Children over 30 kg and adults: 1.2 MIU as a single dose

– Anti-inflammatory treatment
  Start with **acetylsalicylic acid** PO: 50 to 100 mg/kg/day
  If the fever or cardiac signs persist, replace with a corticosteroid:
  prednisolone PO
  Children: 1 to 2 mg/kg/day
  Adults: 60 to 120 mg/day
  Continue this treatment for 2 to 3 weeks after normalisation of the erythrocyte sedimentation rate (ESR), then decrease the doses progressively (over 2 weeks).
  To avoid a relapse, resume the acetylsalicylic acid treatment in parallel with the decrease in prednisolone dose. The acetylsalicylic acid treatment is continued for 2 to 3 weeks after the corticosteroids are fully stopped.

– Secondary prophylaxis
  Prophylactic treatment lasts for several years (until 18 years old, even until 25 years in the case of cardiac effects; for life in the case of chronic valvular damage).
  benzathine benzylpenicillin IM
  Children under 30 kg: 600 000 IU as a single dose every 4 weeks
  Children over 30 kg and adults: 1.2 MIU as a single dose every 4 weeks

Bacterial endocarditis (with native valve)

Bacterial endocarditis is due most often to streptococcus (over 50% of cases), staphylococcus, or enterococcus.
Identify the organism whenever possible (3 blood cultures in 24 hours) and treat according to the result. In the absence of blood cultures or while awaiting the result, treat with a broad spectrum antibiotic combination aimed at the most probable organism according to the likely portal of entry:

- bad dental state, ENT, urinary, or intestinal infection: streptococcus or enterococcus
- cutaneous (wound, particularly those superinfected, an infected or inflamed peripheral catheter, IV drug abusers etc.): staphylococcus

– *First case: streptococcus or enterococcus likely*
Start with **ampicillin** IV: 200 mg/kg/day in 0.9% sodium chloride[3] as a continuous infusion, or failing that, in 4 to 6 regularly spaced injections
+ **gentamicin** IM: 3 mg/kg/day in 1 or 2 injections

- If *streptococcus* is confirmed:
  Stop gentamicin.
  Continue with ampicillin IV for 15 days minimum. Then change to oral treatment with **amoxicillin** PO: 150 to 200 mg/kg/day to complete 4 weeks of treatment.
  Ampicillin IV may be replaced by **ceftriaxone** IM or IV[4] (children: 50 mg/kg once daily, adults: 2 g once daily)
- If *enterococcus* is confirmed:
  Continue ampicillin + gentamicin for 2 weeks, then **amoxicillin** PO: 150 to 200 mg/kg/day to complete 6 weeks of treatment.
  The cefalosporins are not recommended due to frequent resistance.
- If *no organism* is identified (or if there is no blood culture)
  Treat as for enterococcus.

Note: ampicillin IV may be replaced by **benzylpenicillin** IV: 300 000 IU/kg/day as a continuous infusion (or failing that, in 3 to 6 regularly spaced injections).

– *Second case: staphylococcus is likely*
cloxacillin IV: 150 mg/kg/day in 4 injections for 2 weeks minimum, then change to oral treatment with **cloxacillin** PO: 150 mg/kg/day to complete 4 weeks of treatment.
+ **gentamicin** IM: 3 mg/kg/day in 1 or 2 injections for one week

– *Third case: no way to differentiate the organisms*
gentamicin IM for 1 or 2 weeks at the doses indicated above
+ **ampicillin** IV + **cloxacillin** IV at the doses indicated above for 2 weeks minimum
Then **amoxicillin** PO + **cloxacillin** PO at the doses indicated above to complete 4 weeks of treatment.

[3] Ampicillin is stable for 12 hours when it is diluted in 0.9% sodium chloride and for 6 hours when it is diluted in 5% glucose.
[4] The solvent of ceftriaxone for IM injection contains lidocaine. Ceftriaxone reconstituted using this solvent must NEVER be administered by IV route. For IV administration, water for injection must always be used.

Endemic goitre and iodine deficiency

– Goitre is an enlargement of the thyroid gland. Endemic goitre occurs in iodine-deficient areas. Goitre can also be caused or aggravated by the regular consumption of goitrogens such as manioc, cabbage, turnips, millet etc.
– Goitre is an adaptive process: iodine is essential for the production of thyroid hormones; iodine deficiency impairs thyroid hormone synthesis; to compensate, the thyroid gland increases in volume. Thyroid function usually remains normal.
– As well as the development of goitre, iodine deficiency in pregnant women has serious consequences for the child (foetal and perinatal mortality, physical and mental retardation, cretinism). These risks must be prevented by providing iodine supplementation in iodine-deficient areas.

Clinical signs

– The WHO proposes a simplified classification based on the significance of goitre:
Group 0: normal thyroid, no palpable or visible goitre
Group 1: enlarged thyroid, palpable but not visible when the neck is in the normal position
Group 2: thyroid clearly visible when the neck is in the normal position
– Possible mechanical complications (rare): compression, deviation of the trachea or of the oesophagus.

Prevention and treatment

The objective of prevention is to reduce the consequences of iodine deficiency in neonates and children. Supplying iodised salt through national programmes is the recommended method of prevention.
For prevention in populations living in iodine deficient areas where iodised salt is not available and for curative treatment of patients with goitre: use **iodised oil**, according to national protocols. For information (according to the WHO):

Population	Oral iodised oil as a single yearly dose (200 mg capsule)	IM iodised oil, every 2 years using a glass syringe (480 mg/ml ampoule)
Children under 1 year	1 capsule	240 mg (0.5 ml)
Children from 1 to 5 years	2 capsules	480 mg (1ml)
Children from 6 to 15 years	3 to 4 capsules	480 mg (1ml)
Pregnant women	2 capsules	480 mg (1ml)
Women of childbearing age	3 to 4 capsules	480 mg (1 ml)

Curative and preventive single-doses are the same. Oral treatment is preferred. Use injectable iodised oil for prevention only if annual administration of oral iodised oil is not possible. The target populations are pregnant and breastfeeding women, women of childbearing age and children.
In children, goitre disappears after several months. It disappears more slowly (or never) in adults despite restoration of normal thyroid function in 2 weeks. Surgery is only indicated for patients with local mechanical dysfunction.

Psychological disorders

The management of patients presenting with psychological symptoms starts with the exclusion of underlying organic causes: certain neurological disorders may present like psychosis; hyperthyroidism as anxiety, a hypoglycaemic patient may be agitated etc. Perform a clinical examination paying particular attention to a history of physical illness, even, and especially if, the patient is 'known' to have a history of mental illness.

Equally, patients may have physical symptoms which are rooted in mental illness: dyspnoea and heart palpitations may be signs of a *panic attack* (acute anxiety attack); anorexia and pain part of a *depressive syndrome*; delusions of organ dysfunction part of *psychotic disease*. It is the underlying mental disorder that must be considered and treated, after somatic causes have been excluded.

Also consider:
– Substance-related disorders: intoxication by alcohol, solvents, opiates, cannabis etc., or the withdrawal of these substances, may result in psychiatric-like symptoms (depression, anxiety, hallucinations, behaviour disorders etc.). Their use may be concurrent to a mental disorder, but generally it is only after the substance is stopped or a weaning period completed that a diagnosis can be made.
– Culturally shaped manifestations: a behaviour that looks pathological may in fact be banal in the given context. For example, if a recently deceased person appears and speaks to an individual during the mourning period, this may be a normal phenomenon and not a delusional disorder. It is therefore important to work with an 'informant' (in the anthropological meaning of the word) to deal with unfamiliar cultural contexts.

Place of and use of drug therapy

– Drug therapy is only one aspect of the treatment of psychiatric patients. Treatment must also include other therapeutic measures: listening, psychotherapy, and addressing of social factors.
– Use of certain psychotropic drugs may lead to dependence associated with tolerance, and severe withdrawal syndrome on cessation. The risk of creating iatrogenic addiction must be considered.
  • phenobarbital: although sometimes used as a sedative, has no indication in psychiatry and should be reserved for use in the treatment of epilepsy;
  • benzodiazepines (diazepam) should only be used when there are clear medical indications. Treatment with benzodiazepines should be limited to a maximum of 2 to 3 weeks.
– All psychotropic drugs must be prescribed by a physician.
  Psychotropic drugs are not indicated for children under 15 years of age.
  During pregnancy and breastfeeding, psychotropic drugs should only be prescribed in case of **absolute necessity and at the lowest effective dose**.
  Diazepam is strictly contra-indicated in patients with respiratory impairment and clomipramine is contra-indicated in patients with cardiac arrhythmia or with a recent history of myocardial infarction.

Clinical signs and treatment

Anxiety

Patients with anxiety present with both psychological (unexplained fear, fear of dying or going crazy etc.) and physical symptoms (palpitations, difficulty in breathing, feeling of general malaise, hyperventilation). Anxiety may be acute, overwhelming the psychological functioning or persistant.

– *Anxiety may be isolated*:
  • If reassurance fails (one on one with the patient, listening in a understanding and reassuring manner) to resolve an acute anxiety attack or panic attack, treat with **diazepam**: 5 to 10 mg PO or 10 mg IM, to be repeated after 1 hour if necessary
  • Reactionary anxiety, if incapacitating, may sometimes justify a short-term treatment with **diazepam** PO: 5 to 15 mg/day in 2 or 3 divided doses for a few days
– *Always look for an underlying mental disorder*:
  • Anxiety is a constant feature of depression. In addition to antidepressant treatment, give **diazepam** PO: 5 to 15 mg/day in 2 or 3 divided doses for the first 2 weeks of treatment
  • Anxiety during psychosis is relieved with **chlorpromazine** PO: 25 to 150 mg in 2 or 3 divided doses or during a crisis, **chlorpromazine** IM: 25 to 50 mg
  • Anxiety is a characteristic feature of traumatic stress disorders that requires specific treatment (see below, *post-traumatic stress disorder*).

Depression

Symptoms of depression are common following a death or a significant loss (incarceration, population displacement etc.), initial treatment should not be with antidepressants. In these cases, start with supportive care and treatment with anxiolytics.

Depression is characterised by a set of symptoms that vary, but occur over a period of at least 2 weeks and include a change in the usual functioning of the individual. Symptoms include: sadness, thoughts of death, loss of interest and pleasure, fatigue, slowing or agitation, sleep disturbances, loss of appetite, feelings of worthlessness or guilt, poor concentration, anxiety.

Antidepressants should only be prescribed if the patient can continue treatment for at least 6 months and if regular follow-up is possible (support, monitoring of compliance and clinical evolution):
– either **clomipramine** PO: initial dose of 25 mg once daily, to be progressively increased (over several days) to 75 to 150 mg once daily
– or, if available, **fluoxetine** PO (which does not have the same adverse cardiac effects): 20 mg once daily

These dosages must be maintained for 6 months. Be aware that the adverse effects of clomipramine and fluoxetine appear in the first days of treatment while the therapeutic effects are not seen for 3 to 4 weeks. This must be clearly explained to the patient.

Suicide risk is increased from the 10th to 15th days of treatment. Diazepam may be added to the treatment, particularly in patients with severe depression, severe anxiety or incapacitating insomnia: **diazepam** PO: 5 to 15 mg/day in 2 or 3 divided doses, for a maximum of 2 weeks.

Post-traumatic stress disorder (PTSD)

At least 1/3 of individuals who have been exposed to traumatic events (witnesses or victims of physical assault or rape or of natural disasters) develop long term problems. These problems (unexplained somatic complaints, anxiety, depression, behaviour disorders) are often the cause of repeated consultations.

PTSD includes both psychological and physical symptoms that persist for more than 1 month after the traumatic event.

There are 3 principle groups of symptoms:

– *Intrusion*
  The patient describes:
  • intrusive images or thoughts linked to the traumatic event despite efforts to block them out,
  • recurrent distressing dreams linked to the traumatic event,
  • flashback episodes during which the patient feels as if he relives part of the traumatic event.

– *Avoidance*
  The patient tries to avoid:
  • everything that might be associated with the trauma (places, situations, people),
  • having thoughts about the trauma: alcohol, psychotropic drugs or toxic drugs may be used for this purpose.

– *Increased arousal*
  anxiety, insomnia, exaggerated startle response, panic attacks; sometimes hypertension, sweating, trembling, tachycardia, headache etc.

Other symptoms:

– *Behavioural*
  Avoidance of social and family relationships, diminished interest and participation in usual activities, drug and alcohol use.

– *Affective*
  Sadness, irritability, difficulty controlling emotions, outbursts of anger, feelings of being misunderstood, a sense of foreshortened future.

– *Physical*
  • physical expression of anxiety: fatigue, gastrointestinal disturbances, pain;
  • panic attacks: sudden onset of dyspnoea with tachycardia, palpitations, trembling, tightening of the chest, feeling that one is going to die or go crazy;
  • conversion disorders: pseudoparalysis, pseudoseizures.

– *Cognitive*
  Difficulty concentrating or with memory.

Symptoms may appear immediately or several months after the traumatic event. Once symptoms have persisted for more than 1 month, they rarely resolve spontaneously. A true depressive syndrome may appear secondarily. Psychological intervention should be a priority.

Psychological interventions

– It is important to make the patient understand that his symptoms are part of an understandable reaction to a very abnormal event.

– The patient has to be reminded that improvement will take time and that he will not forget the event, but that the memories will become less and less painful.

– The patient should be encouraged to describe his experience in a supportive and understanding setting (not only what happened, what he saw, heard or felt), but also his *emotions* and *thoughts*. The session should be managed with tact. Avoid:
  • giving an opinion or judging, expressing personal opinions;
  • reassurance or denying guilt ('it isn't your fault, at least you survived') as this only devalues what the patient expresses;
  • over active exploration of the patient's emotions (it is up to the patient to decide how far they want to go).

– If available, participation in group therapy may be beneficial. If these different measures do not help the patient, specialized individual treatment is recommended.

Behavioural treatment

It is important to assure the patient's physical and material security, to encourage abstinence from alcohol and toxic substances (which may aggravate symptoms), and to encourage the patient to participate in social activities and peer support and to help him imagine objectives for the future.

Treatment with phychotropic drugs

Benzodiazepines must be used very cautiously: they are not very effective and rapidly lead to dependence (see *place of and use of drug therapy*, page 289). They may be useful for a short period of time in patients with insomnia.

Clomipramine is effective against anxiety and increased arousal, and may reduce flashbacks. It is indicated if the symptoms persist despite the therapeutic measures described above or if depression complicates the clinical picture:
– either **clomipramine** PO: initial dose of 25 mg once daily, to be progressively increased (over several days) to 75 to 150 mg once daily
– or, if available, **fluoxetine** PO (which does not have the same adverse cardiac effects): 20 mg once daily

These dosages must be maintained for 6 months. Be aware that the adverse effects of clomipramine and fluoxetine appear in the first days of treatment while the therapeutic effects are not seen for 3 to 4 weeks. This must be clearly explained to the patient.

In some cases, specific interventions during the first days following the traumatic event may reduce the severity and duration of symptoms. If there are no mental health specialists in the field, the sections *psychological treatment and behavioural treatment* may prove useful.

Psychosis

An acute or chronic pathological state characterised by the presence of delusional thoughts: the patient is convinced of things that are beyond reality (e.g. hallucinations, ideas of persecution etc.). The delusions are sometimes associated with ego splitting (in schizophrenia or brief psychotic disorders): there is a loss of coherence between the affect, thoughts and behaviour and a lack of continuity in thoughts and speech.

Symptoms are improved with the use of **haloperidol** PO (3 to 10 mg/day) that must be prescribed for an extended period of time. If extra-pyramidal adverse effects occur, it may be helpful to add **biperiden** PO (2 mg 1 to 3 times/day). Treatment must include psychotherapy and social therapy and, whenever available, care by mental health specialists (particularly if there is a risk of confusion with culturally shaped manifestations (trance like states or possession may occur).

Agitation

Psychomotor agitation requires a diagnostic process which is rarely immediately possible.

- If possible, try to calm the patient down in a quiet place, with only 2 people present. Start by talking about physical symptoms: "you aren't feeling well, I am going to take your blood pressure" and then proceed with the examination. Try to identify if the person is oriented (confusion) and coherent (psychosis).
- Do not forget medical causes (e.g. neurological disorders) and toxic causes (intoxication, withdrawal).
- For patients with moderate agitation without respiratory difficulty:
  diazepam PO or IM: 10 mg to be repeated after 30 to 60 minutes if necessary.
- For patients with significant agitation and/or signs of psychosis (loss of contact with reality, delirium):
  chlorpromazine PO or IM: 25 to 50 mg to be repeated a maximum of 3 times in 24 hours

Insomnia

- *'Insomnia' linked to life conditions* (life on the streets, in institutions etc.): there is no specific treatment.
- *'Insomnia' linked to a physical problem*: do not give sedatives, treat the cause (e.g. give analgesics for pain).
- *'Insomnia' linked to drug therapy* (corticosteroids) or use of toxic substances (alcohol etc.): treatment is adapted on an individual basis.
- *'Insomnia' linked to a mental disorder* (depression, anxiety, post-traumatic stress disorder, delusional state): symptomatic treatment for no more than 2 weeks may be given (**diazepam** PO: 5 to 10 mg once daily at night). The underlying cause must be treated.
- *Isolated insomnia, usually linked to a particular event*: symptomatic treatment with **diazepam** PO: 5 to 10 mg once daily at night for no more than 2 weeks.

Annexes

Epidemiological reports

The goal of these reports is to facilitate and standardize data collection for epidemiological surveillance in order to identify trends and to act as an early warning system.
They are also used in weekly and monthly assessment of programme activities and in writing three-monthly and yearly reports.
The forms presented below are frameworks for data collection which should be adapted to the health structure (refugee camp, reference hospital, health centre) and the specific type of programme (tuberculosis etc.).

Identification

Country: ..... Week or month: .....

Place or site: ..... Year: .....

Population

Monthly or weekly report

Source: .....

Total of previous week or month: ☐

Arrivals: + ... – Departures: .....

Births: + ... – Deaths: .....

\+ Subtotal: ..... – Subtotal: ..... End of week/month total ☐

$$\text{Average population} = \frac{\text{total of previous week/month} + \text{end of week/month total}}{2} = \square$$

Age distribution

Method of data collection: Survey ☐ Census ☐ Register ☐

Date of data collection: .....

	Male	Female	0-4 years	5-14 years	15 years and over	Total
%						100%
Number						

Medical staff

The qualification (diploma, speciality, training) of each member of the medical staff should be specified in a table adapted to the local situation (see example below):

	Expatriates	National staff	Refugees	Total
Doctors				
Nurses				
Midwives				
Medical auxilaries (curative)				
Laboratory technicians				
Community health workers (preventive)				
Village birth attendants				
Other: surgeons, dentists, ophthalmologists, pharmacists etc.				
Temporary staff				
Other (specify): – – – – – – – –				

Mortality

The data should be collected by local authorities (traditional or religious chiefs, civil authorities, community health workers) in order to obtain the most representative data including deaths occurring outside health structures. Mortality can also be evaluated by counting new graves at the cemetery.

The personnel in charge of death records (political, administrative or religious authorities) should be trained. This training consists of describing the most frequent diseases and how to use a register. Only the primary cause of death is of interest.

Example of a mortality report

Data source: ..... Time period: .....

Probable cause of death	< 1 year	1-4 years	5-14 years	15 years and over	Total
Respiratory infection					
Diarrhoea					
Malaria					
Measles					
Complication of pregnancy / delivery					
Neonatal death					
Trauma (accident etc.)					
Other (specify): – – –					
Unknown cause					
Total					

Calculation of a crude mortality rate

$$\frac{\text{number of deaths per day}}{\text{population}} \times 10\,000$$

Number of deaths / 10 000 population / day	Interpretation
0.5	level reached in developed countries
0.5 to 1	controlled situation
1 to 2	serious situation
more than 2	out of control situation
more than 5	major catastrophe

Morbidity

Record of new cases diagnosed during a defined period (week, month), with a view to a practical intervention (it is not useful to report diseases for which no intervention is possible). For case definitions, see next page.

Example of a morbidity report

Diseases	0-4 years	5-14 years	15 years and over	Total
Upper respiratory tract infections				
Lower respiratory tract infections				
Diarrhoea (non-bloody)				
Diarrhoea (bloody)				
Malaria				
Measles				
Eye infections				
Skin infections				
Sexually transmitted infections				
Tuberculosis (suspected)				
Jaundice				
Meningitis (suspected)				
Trauma				
Other (specify): – – – – –				
Total new cases				

Repeat consultations: .....

Transferred: .....

Total consultations: .....

Rules for morbidity data collection

– Only one diagnosis is recorded per patient (the diagnosis is the one directly related to the reason for the consultation).
– The information is collected by physicians, nurses and medical auxiliaries. The medical auxilaries are supervised to ensure they respect the case definitions.
– **Only the new cases are recorded**: patients consulting again for the same complaint are recorded on the line "repeat consultations".

Case definitions

– ***Upper respiratory tract infections***: any nose and/or sinus, and/or throat and/or ear and/or pharynx and/or larynx infection (rhinitis, rhinopharyngitis, sinusitis, otitis, laryngitis, tonsillitis).
– ***Lower respiratory tract infections***: any episode of respiratory infection below the larynx (bronchitis, pneumonia, bronchiolitis) associated with fever **and** cough **and** tachypnoea.
– ***Malaria***: any fever, complicated or not, related to malaria (specify the definition: clinical or with laboratory confirmation).
– ***Measles***: fever with maculopapular rash or Koplik's spots, with or without cough, runny nose, conjunctivitis.
– ***Diarrhoea***:
  • non-bloody: three or more soft or liquid stools per day **and** no blood in the stool (estimates the frequency of viral and choleriform diarrhoea)
  • bloody: three or more soft or liquid stools per day **and** presence of blood in the stool (estimates the frequency of entero-invasive diarrhoea)
– ***Eye infections***: any unilateral or bilateral inflammation of the conjunctiva or any other part of the eye: conjunctivitis, trachoma, keratitis etc.
– ***Skin infections***: any cutaneous lesion, of any extent, that appears to be infectious, due to a bacterium (pyoderma, abscess etc.), virus (herpes simplex and herpes zoster), fungus (ringworm etc.) or parasite (scabies etc.).
– ***Sexually transmitted infections***: all genital infections (ulcers or discharge) apparently from sexual contact.
– ***Jaundice***: yellow conjunctivae, with or without dark coloured urine and discoloured stools, irrespective of the associated signs (estimates the frequency of hepatitis).
– ***Tuberculosis*** (suspected): cough for more than 3 weeks with sputum production and weight loss.
– ***Meningitis***: any infectious episode associated with fever **and** vomiting **and**:
  • in patients over one year: stiffness of the neck and intense headache
  • in patients under one year: hypotonia and bulging fontanelle
– ***Trauma***: all consultations related to trauma (fights, falls, burns, wounds etc.).
– ***Others***: tetanus, poliomyelitis, diphtheria, whooping cough, typhus, leprosy, trypanosomiasis etc., adapt according to the local situation.
  Each of these supplementary items must be defined and the case definition added to the list above.

The New Emergency Health Kit 98 - WHO (extracts from)

Drugs and medical supplies for 10,000 persons for approximately 3 months

List of contents

Introduction

In recent years the various organizations and agencies of the United Nations system have been called upon to respond to an increasing number of large-scale emergencies and disasters, many of which pose a serious threat to health. Much of the assistance provided in such situations by donor agencies, governments, voluntary organizations and others is in the form of drugs and medical supplies. But the practical impact of this aid is often diminished because requests do not reflect the real needs or because these have not been adequately assessed. This can result in donations of unsorted, unsuitable and unintelligibly labelled drugs, or the provision of products which have passed their expiry date. Such problems are often compounded by delays in delivery and customs clearance.

The World Health Organization (WHO), which is the directing and coordinating authority for international health work within the United Nations system, took up the question of how emergency response could be facilitated through effective emergency preparedness measures. After several years of study, field testing and modifications, standard lists of essential drugs and medical supplies for use in an emergency were developed. The aim was to encourage the standardization of drugs and medical supplies used in an emergency to permit a swift and effective response with supplies that meet priority health needs. A further goal was to promote disaster preparedness, since such standardization means that kits of essential items can be kept in readiness to meet urgent requirements.

The WHO Emergency Health Kit, which resulted from this work, was developed in the early 1980s in collaboration with the Office of the United Nations High Commissioner for Refugees (UNHCR) and the London School of Hygiene and Tropical Medicine. In 1988 it was revised with the help of the Emergency Preparedness Programme (WHO, Geneva), the Unit of Pharmaceuticals (WHO, Geneva), UNHCR, UNICEF, Médecins Sans Fontières (MSF), the League of Red Cross and Red Crescent Societies (Geneva), the Christian Medical Commission of the World Council of Churches and the International Committee of the Red Cross.

The kit has been adopted by many organizations and national authorities as a reliable, standardized, inexpensive, appropriate and quickly available source of the essential drugs and health equipment urgently needed in a disaster situation. Its contents are calculated to meet the needs of a population of 10,000 persons for three months. It has been renamed the "New Emergency Health Kit" because of the number and diversity of United Nations agencies and other bodies which have adopted this list of drugs and medical supplies for their emergency operations and which participated in its revision.

A booklet providing background information on the development of the kit, comments on the selection of items, treatment guidelines for prescribers and some useful checklists for suppliers and prescribers was published in 1990. Chapter 1 (Essential drugs and supplies in emergency situations) is intended as a general introduction for health administrators and field officers. Chapter 2 (Comments on the selection of drugs, medical supplies and equipment included in the kit) contains more technical details and is intended for prescribers.

The latest review of the New Emergency Health Kit began in December 1996, and was brought about not so much by the need to change the concept or content of the kit, but rather to adapt the list of drugs to changes that had taken place, over the years, in the selection of drugs on the WHO Model List of Essential Drugs; and also to bring the kit in line with a new UN list of drugs recommended for use in acute emergencies (see references; Emergency Relief Items, Vol. 2, UNDP[1)]). The opportunity was also taken to make a number of necessary revisions to the text and annexes and to add two annexes containing Guidelines for Drug Donations and Model Guidelines for the International Provision of Controlled Medicines for Emergency Care. The WHO Divisions of Child Health and Development, Control of Tropical Diseases, Emergency and Humanitarian Action, Emerging and other Communicable Diseases Surveillance and Control, and Family and Reproductive Health all contributed to revision of the 1998 text and annexes, in addition to the original partners and the United Nations Population Fund (UNPFA).

The WHO Action Programme on Essential Drugs has coordinated the review process and has issued this interagency document. The support of all persons and organizations who have contributed to the revision process is gratefully acknowledged.

1) UNDP. *Emergency relief items, compendium of basic specifications, vol. 2. Medical supplies and equipment, selected essential drugs, guidelines for drug donations.* New York: United Nations Development Programme; 1996.

Chapter 1: Essential drugs and supplies in emergency situations

What is an Emergency ?

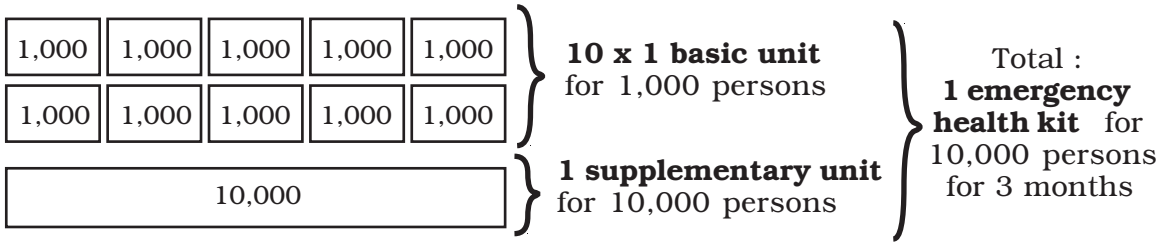
The term "emergency" is applied to various situations resulting from natural, political and economic disasters. The New Emergency Health Kit 98 (NEHK98) is designed to meet the primary care needs of a displaced population without medical facilities, or a population with disrupted medical facilities in the immediate aftermath of a disaster. It must be emphasized that, although supplying drugs and medical supplies in the standard kits is convenient early in an emergency, specific local needs must be assessed as soon as possible and further supplies must be ordered accordingly.

Quantification of drug requirements

Morbidity patterns may vary considerably between emergencies. For example, in emergencies where malnutrition is common morbidity rates may be very high. For this reason an estimation of drug requirements from a distance can only be approximate, although certain predictions can be made based on past experience. For the present kit estimates have been based on the average morbidity patterns among refugee populations and the use of standard treatment guidelines. The quantities of drugs supplied will therefore only be adequate if prescribers follow these guidelines.

Contents of the kit

NEHK98 consists of two different sets of drugs and medical supplies, named a *basic unit* and a *supplementary unit*. To facilitate distribution to smaller health facilities on site, the quantities of drugs and medical supplies in the basic unit have been divided into ten identical units for 1,000 persons each.



The **basic unit** contains drugs, medical supplies and some essential equipment for primary health care workers with limited training. It contains 12 drugs, none of which are injectable. Simple treatment guidelines, based on symptoms, have been developed to help the training of personnel in the proper use of the drugs. Copies of these treatment guidelines, an example of which is printed in Annexes 1-3, should be included in each unit. Additional copies can be obtained from the Action Programme on Essential Drugs, WHO, Geneva.

The **supplementary unit** contains drugs and medical supplies for a population of 10,000 and is to be used only by professional health workers or physicians. It does not contain any drugs or supplies from the basic units and can therefore only be used when these are available as well.

The selection and quantification of drugs for the basic and supplementary units have been based on recommendations for standard treatment regimens from technical units within WHO. A manual describing the standard treatment regimens for target diseases, developed in collaboration between Médecins Sans Frontières and WHO, is available from Médecins Sans Frontières at cost price and one copy in English, French and Spanish is included in each supplementary unit.

To facilitate identification in an emergency, one green sticker (international color code for medical items) should be placed on each parcel. The word "BASIC" should be printed on stickers for basic units.

Referral system

Health services can be decentralized by the use of basic health care clinics (the most peripheral level of health care) providing simple treatment using the basic units. Such a decentralization will: (1) increase the access of the population to curative care; and (2) avoid overcrowding of referral facilities by solving all common health problems at the most peripheral level. Basic treatment protocols have been drawn up to allow these health workers to take the right decision on treatment or referral, according to the symptoms.

The first referral level should be staffed by professional health workers, usually medical assistants or doctors, who will use drugs, supplies and equipment from both the basic and the supplementary units. It should be stressed here that the basic and supplementary units have not been intended to enable these health workers to treat rare diseases or major surgical cases. For such patients a second level of referral is needed, usually a district or general hospital. Such facilities are normally part of the national health system and referral procedures are arranged with the local health authorities.

Drug and supply management control

An appropriate drug management system must be put in place as soon as possible to maximize cost efficiency and to gather information allowing for re-supply to be based on specific needs. An appropriate drug management system should be based on:

- case definition and treatment protocols for significant public health diseases;
- morbidity and mortality statistics;
- random checks to compare drug consumption datawith morbidity statistics.

Procurement of the kit

NEHK98 can be provided from a number of major pharmaceutical suppliers, some of which will have a permanent stock of kits ready for shipment within 24 hours. It may however be desirable to secure procurement at the regional level to reduce the cost of shipping. The procuring agency should ensure that manufacturers comply with the guidelines for quality, packaging and labelling of drugs and all items are compatible with the specifications in the UN list of medical supplies, equipment and drugs[2)].

It is important to note that many drugs in the kit can be considered as examples of a therapeutic group, and that other drugs can often serve as alternatives. This should be taken into consideration when drugs are selected at the national level, since the choice of drugs may then be influenced by whether equivalent products are immediately available from local sources, and their comparative cost and quality. National authorities may wish to stockpile the same or equivalent drugs and supplies as part of their emergency preparedness programme. The kit can also serve as a useful baseline supply list of essential drugs for primary health care.

Immunization in emergency

Experience in past emergencies involving displacements of populations has shown that measles is one of the major causes of death amongst young children. The disease spreads rapidly in overcrowded conditions, and serious respiratory tract infections are frequent, particularly in malnourished children.

However, measles-related mortality is preventable. Measles vaccine administration should therefore be given a high priority, with all children between six months and five years old being immunized. Children immunized before nine months should be re-immunized as soon after nine months as possible. All children in the target age group should be immunized, irrespective of history. The occurence of measles in a camp is not a contraindication.

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2) UNDP. *Emergency relief items, compendium of basic specifications, vol. 2. Medical supplies and equipment, selected essential drugs, guidelines for drug donations.* New York: United Nations Development Programme; 1996.

Children with clinical measles should be treated promptly for complications, enrolled in a supplementary feeding programme and given appropriate doses of vitamin A.

Reproductive health

Certain reproductive services have been defined as essential for a displaced population after an emergency. Such essential services include: provisions for professional midwifery care, emergency contraception for victims of rape, treatment of sexually transmitted infections and contraception in general. Supplies for the first two are included in the kit; others will have to be ordered separately according to need.

Professional midwifery care is an essential service for which the necessary instruments and drugs are included in the kit. Sexual violence is widespread during the early phases of forced population movements. All possible measures should be taken to prevent and manage its occurence and a small quantity of emergency contraception for victims of rape is included in the kit. It is acknowledged that cultural and religious beliefs may preclude some women and health workers from using this treatment, and it is strongly recommended that health workers assist the victim as much as possible in reaching an informed decision.

Comprehensive reproductive health services require to be integrated into the primary health care system as soon as possible and a referral system for obstetric emergencies must be made accessible to the population. It is also recommended that a qualified and experienced person be appointed as reproductive health coordinator. To assist a reproductive health programme the United Nations Population Fund (UNFPA) has designed a number of reproductive health kits for all levels of the health care system durind an emergency.

Post emergency needs

After the acute phase of an emergency is over and basic health needs have been covered by the basic and supplementary units, specific needs for further supplies should be assessed as soon as possible. In most cases this will necessitate a quick description and, if possible, quantification of the morbidity profile. It should characterize the most common diseases and should identify the exposed and high risk groups in the population (e.g. children below 5 years of age and pregnant women). These high risk groups should be the first target of the continuing health care programme. Any other factors that may influence requirements should also be taken into account, e.g. the demographic pattern of the community, the physical condition of the individuals, seasonal variations of morbidity and mortality, the impact of improved public health measures, the local availability of drugs and other supplies, drug resistance, usual medical practice in the country, capabilities of the health workers and the effectiveness of the referral system.

Chapter 2: Comments on the selection of drugs, medical supplies and equipment included in the kit

The composition of NEHK98 is based on epidemiological data, population profiles, disease patterns and certain assumptions borne out by emergency experience. These assumptions are :

- The most peripheral level of the health care system will be staffed by health workers with only limited medical training, who will treat symptoms rather than diagnosed diseases using the basic units and who will refer to the next level those patients who need more specialized treatment.
- Half of the population is 0-14 years of age;
- The average number of patients presenting themselves with the more common symptoms or diseases can be predicted;
- Standardized schedules will be used to treat these symptoms or diseases;
- The rate of referral from the basic to the next level is 10 %;
- The first referral level of health care is staffed by experienced nurses, midwives, medical assistants or medical doctors, with no or very limited facilities for inpatient care. They will use the supplementary unit in conjunction with one or more basic units;
- If both the basic and first referral health care facilities are within reasonable reach of the target population, every individual will, on average, visit such facilities four times per year for advice or treatment. As a consequence the supplies in the kit, which are sufficient for approximately 10,000 outpatient consultations, will serve a population of 10,000 people for a period of approximately 3 months.

Selection of the drugs

Injectable drugs

There are no injectable drugs in the basic unit. Basic health workers with little training have usually not been taught to prescribe injections, neither are they trained to administer them. Moreover, the most common diseases in their uncomplicated form do not generally require an injectable drug. Any patient who needs an injection must be referred to the first referral level.

Antibiotics

Infectious bacterial diseases are common at all levels of health care, including the most peripheral, and basic health workers should therefore have the possiblity to prescribe an antibiotic. However, many basic health workers have not been trained to prescribe antibiotics in a rational way. Cotrimoxazole is the only antibiotic included in the basic unit, and this will enable the health worker to concentrate on taking the right decision between prescribing an antibiotic or not, rather than on the choice between several antibiotics. Cotrimoxazole has been selected because it is active against the most common bacteria found in the field, especially S. pneumoniae and H. influenzae for acute respiratory infections. It is also stable under tropical conditions, needs to be taken only twice daily and its side-effects (exfoliative dermatitis or bone marrow depression) are uncommon. In addition to this it is less expensive than other antibiotics. The risk of increasing bacterial resistance must be reduced by rational prescribing practice.

Medication for children

The only paediatric tablet included in the list is paracetamol tablet 100 mg. Syrups for children are not included because of their instability, their short shelf-life after reconstitution and their volume and weight. Instead, for children, half or quarter adult tablets may be crushed and administered with a small volume of fluid, with sweets or with food.

Drugs not included in the kit

The kit includes neither the common vaccines nor any drugs against communicable diseases such as tuberculosis[3)] or leprosy. The vaccines needed and any plans for an expanded programme on immunization should be discussed with the national authorities as soon as possible; the same applies for programmes to combat communicable diseases. In general no special programme should be initiated unless there is sufficient guarantee for its continuation over a longer period.

In addition, drugs in the kit do not cover some specific health problems occurring in certain geographical areas, e.g. specific resistant malaria strains. The treatment of choice for eclamptic fits is intravenous and intramuscular magnesium sulfate. Staff may however be unfamiliar with its use and diazepam, which has other therapeutic indications, therefore remains in the kit. Ergometrine injection requires a cold chain because it is unstable if subjected to high ambient temperatures, and is therefore not included in the kit. Oxytocin is being supplied instead. No specific drugs are included for the treatment of sexually transmitted infections.

3) The general prerequisites for the establishment of a tuberculosis control programme for refugees and displaced persons are: 1) the emergency phase is over; 2) security in and stability of the camp or site is envisioned for at least six months; 3) basic needs of water, adequate food and sanitation are available; and 4) essential clinical services and drugs are available.

Selection of renewable supplies

Syringes and needles

Considering the risk of direct contamination with hepatitis and HIV during handling, needles are dangerous items. The health risk for the staff should be limited by the following means:

- limiting the number of injections;
- using disposable needles only;
- using disposable syringes whenever possible (always disposable autodestruct syringes in immunization campaigns),
- using safety boxes designed for the collection and incineration of used syringes and needles;
- strictly following the destruction procedures for disposable material.

It is less dangerous to handle syringes than needles. For this reason a system with resterilizable nylon syringes and disposable needles has been chosen for the supplementary unit. However, in the very first stage, when sterilization procedures are not yet established, some provision will be necessary for giving injections by means of fully disposable materials. A small number of disposable syringes are therefore provided in the supplementary unit and their disposal should be supervised by the person in charge. Resterilizable syringes are likely to be phased out in the future.

It is strongly recommended that all the disposable syringes in the kit are substituted by autodestruct, single use syringes as soon as the right products become commercially available.

Gloves

Disposable protective gloves are provided in the basic unit to protect health workers against possible infection during dressings or handling of infected materials. In any case a dressing should be applied or changed with the instruments provided in the kit. Surgical gloves, which should be resterilizable, are supplied in the supplementary unit. They are to be used for deliveries, sutures and minor surgery, all under medical supervision.

Selection of equipment

Resuscitation / Surgical instruments

The kit has been designed for general medicine under primitive conditions, and for that reason no equipment for resuscitation or major surgery has been included. In situations of war, earthquakes or epidemics, specialised teams with medical equipment and supplies will be required.

Sterilization

A complete sterilization set is provided in the kit. The basic units contain two small drums each for sterile dressing materials. Two drums are included to enable the alternate sterilization of one at the first referral level while the other is being used in the peripheral facility. The supplementary unit contains a kerosene stove and two pressure sterilizers, a small one for sterilizing 2 ml and 5 ml syringes, and a larger one for the small drums with dressing materials and the instrument sets.

Dilution and storage of liquids

The kit contains several plastic bottles and a few large disposable syringes which are needed to dilute and store liquids (e.g. benzyl benzoate, chlorhexidine and gentian violet solution).

Water supply

The kit contains several items to help provide for clean water at the health facility. Each basic unit contains a 20 litre foldable jerrycan and two 12 litre plastic buckets. The supplementary unit contains a water filter with candles and tablets of sodium dichloro-isocyanurate (NaDCC) to chlorinate the water[4)].

4) Each effervescent tablet containing 1.67 g of NaDCC releases 1 g of available chlorine when dissolved in water. NaDCC also goes under the name of sodium troclosene or sodium dichloro-s-triazinetrione.

Chapter 3: Composition of the New Emergency Health Kit 98

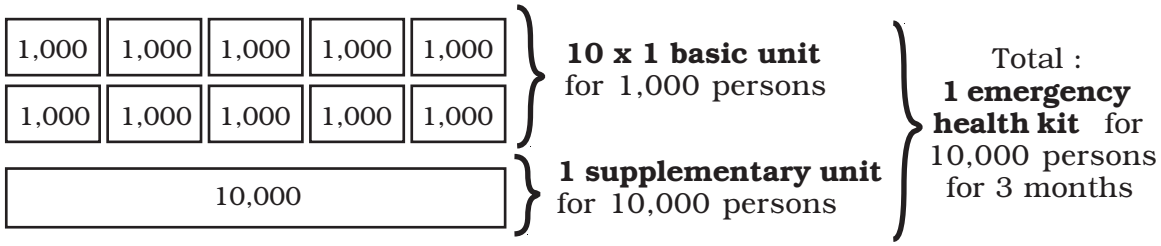
NEHK98 consists of 10 basic units and one supplementary unit.

10 basic units (for basic health workers), each unit for a population of 1,000 persons for 3 months. Each unit contains drugs, renewable supplies and basic equipment packed in one carton.

One supplementary unit for physicians and senior health workers, for a population of 10,000 people for 3 months. One supplementary unit contains :

- drugs (approximately 130 kg)
- essential infusions (approximately 180 kg)
- renewable supplies (approximately 60 kg)
- equipment (approximately 40 kg)

NB: The supplementary unit does not contain any drugs and medical supplies from the basic unit. To be operational, the supplementary unit should be used together with at least one or several basic units.



Basic unit (for 1,000 persons for 3 months)

Drugs

acetylsalicylic acid, tab 300 mg	tab	3,000
aluminium hydroxide, tab 500 mg	tab	1,000
benzyl benzoate, lotion 25% [5]	bottle 1 litre	1
chlorhexidine (5%) [6]	bottle 1 litre	1
chloroquine, tab 150 mg base [7]	tab	2,000
ferrous sulfate + folic acid, tab 200 + 0.25 mg	tab	2,000
gentian violet, powder	25 g	4
mebendazole, tab 100 mg	tab	500
ORS (oral rehydration salts)	sachet for 1 litre	200
paracetamol, tab 100 mg	tab	1,000
sulfamethoxazole + trimethoprim, tab 400 + 80 mg (cotrimoxazole)	tab	2,000
tetracycline eye ointment 1 %	tube 5 g	50

Renewable supplies

absorbent cotton wool	kg	1
adhesive tape 2.5 cm x 5 m	roll	30
bar of soap (100-200 g)	bar	10
elastic bandage (crepe) 7.5 cm x 5 m	unit	20
gauze bandage with selvedge 7.5 cm x 5 m,	roll	200
gauze compress 10 x 10 cm, 12 ply, nonsterile	unit	500
ballpen, blue or black	unit	10
exercise book A4, hard cover [8]	unit	4
health card + plastic cover [9]	unit	500
small plastic bag for drugs	unit	2,000
notepad A6	unit	10
thermometer, Celsius, clinical, flat type	unit	6
glove, examination, latex pre-powdered non sterile, disposable	unit	100
treatment guidelines for basic list [10]	unit	2

5) According to WHO recommendations, benzyl benzoate solution 25% concentration is being supplied. The use of 90% concentration is not recommended.

6) 5% solution is WHO standard. Chlorhexidine 20% needs distilled water for dilution, otherwise precipitation may occur. Recommended alternatives include the combination of chlohexidine 1.5% and cetrimide 15%.

7) The therapeutic dosage of chloroquine is usually expressed as milligrams of chloroquine base. A tablet of 150 mg chloroquine base (commonly used in anglophone countries) is equivalent to 204 mg chloroquine sulfate or 241 mg of chloroquine phosphate. Tablets of 100 mg chloroquine base (mostly used in francophone countries) are equivalent to 136 mg chloroquine sulfate or 161 mg chloroquine phosphate. For NEHK98, tablets of 150 mg base are recommended. The treatment guidelines are also expressed in tablets of 150 mg chloroquine base.

8) It is recommended that one exercise book be used for recording daily drug dispensing and another for daily basic morbidity data.

9) For sample health card (see Annex 5).

10) For sample treatment guidelines (see Annex 2).

Equipment

nail brush, plastic, autoclavable	unit	2
bucket, plastic, approximately 12 litres	unit	1
gallipot, stainless steel, 100 ml	unit	1
kidney dish, stainless steel, approximately 26 x 14 cm	unit	1
dressing set (3 instruments + box) [11]	unit	2
dressing tray, stainless steel, approximately 30 x 15 x 3 cm	unit	1
drum for compresses with lateral clips 10 cm H, diam.15 cm	unit	2
foldable jerrycan, 20 litres	unit	1
forceps Kocher, no teeth, 12-14 cm	unit	2
plastic bottle, 1 litre	unit	3
syringe Luer, disposable, 10 ml	unit	1
plastic bottle, 125 ml	unit	1
scissors straight/blunt, 12-14 cm	unit	2

Supplementary unit (for 10,000 persons for 3 months)

Drugs

Anaesthesics

ketamine, inj. 50 mg/ml	10 ml / vial	25
lidocaine, inj. 1 % [12]	20 ml / vial	50

Analgesics [13]

morphine, inj. 30 mg/ml [14]	1 ml / ampoule	50

Recall from basic unit:

acetylsalicyclic acid, tab 300 mg	*(10 x 3,000)*	*30,000*
paracetamol, tab 100 mg	*(10 x 1,000)*	*10,000*

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[11] Dressing set (3 instruments + box):
- 1 stainless steel box approximately 17 x 7 x 3 cm
- 1 pair surgical scissors, sharp/blunt, 12-14 cm
- 1 Kocher forceps, no teeth, straight, 12-14 cm
- 1 dissecting forceps, no teeth, 12-14 cm

[12] 20 ml vials are preferred, although 50 ml vials may be used as an alternative.

[13] Alternative injectable analgesics include pentazocine and tramadol which are considered inferior and are therefore not included in the WHO Model List of Essential Drugs. It is however recognized that these constitute a practical alternative to morphine in those situations where opioids cannot be sent.

[14] Import and export permits are normally required for shipment of morphine as it is a controlled drug coming under the UN Single Convention on Narcotic Drugs. Pentazocine (previously recommended in the NEHK) and tramadol (supplied by some humanitarian organizations), diazepam and phenobarbital are now controlled drugs in some countries and come under control measures additional to the UN Convention on Psychotropic Substances, resulting in the requirement for an import permit before authorization of an export permit. The *Model guidelines for the international provision of controlled medicines for emergency care* are designed to facilite supply of all such controlled drugs in emergencies.

Anti-allergics

hydrocortisone powder 100 mg ..... 100 mg, powder for inj.in vial	50
prednisolone, tab 5 mg ..... tab	100
epinephrine (adrenaline), see "respiratory tract"	

Antidotes

naloxone inj. 0.4 mg/ml [15] ..... 1 ml/ampoule	20

Anticonvulsants/anti-epileptics

diazepam, inj. 5 mg/ml ..... 2 ml / ampoule	200
phenobarbital, tab 50 mg ..... tab	1,000

Anti-infective drugs

amoxicillin, tab 250 m ..... scored tab	3,000
ampicillin, inj. 500 mg /vial ..... vial	200
benzathine benzylpenicillin, inj. 2.4 MIU / vial (long acting penicillin) ..... vial	50
benzylpenicillin, inj. 5 MIU / vial ..... vial	250
chloramphenicol, caps 250 mg ..... caps	2,000
chloramphenicol, inj. 1 g / vial ..... vial	500
doxycycline, tab 100 mg ..... tab	2,000
metronidazole, tab 250 mg ..... tab	2,000
nystatin, non-coated tablet [16] ..... 100,000 IU / tab	1,000
nystatin, vaginal tab ..... 100,000 IU / tab	1,000
procaine benzylpenicillin, inj. 3-4 MU / vial [17] ..... vial	750
quinine, inj. 300 mg/ml [18] ..... 2 ml / ampoule	100
quinine, sulfate, tab 300 mg ..... tab	3,000
sulfadoxine + pyrimethamine, tab 500 mg + 25 mg [19] ..... tab	300
Recall from basic unit:	
mebendazole, tab 100 mg ..... (10 x 500) 5,000	
cotrimoxazole, tab 400 + 80 mg ..... (10 x 2,000) 20,000	
chloroquine, tab 150 mg base ..... (10 x 2,000) 20,000	

Blood, drugs affecting the

folic acid, tab 5 mg ..... tab	1,000
Recall from basic unit:	
ferrous sulfate + folic acid, tab 200 + 0.25 mg ..... (10 x 2,000) 20,000	

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[15] Naloxone is an opioid antagonist given intravenously for the treatment of opioid overdosage and to reverse the effects of therapeutic doses of opioids. It has been added because morphine is in the kit.

[16] For the treatment of oral candidiasis; it may be replaced by an equivalent quantity of nystatin suspension.

[17] The combination of procaine benzylpenicillin 3 million IU and benzylpenicillin 1 million IU (procaine penicillin fortified) is used in many countries and may be included as an alternative.

[18] For the treatment of cerebral and resistant malaria cases. Intravenous injection of quinine must always be diluted in 500 ml glucose 5%.

[19] For the treatment of resistant malaria strains (check national protocols).

Cardiovascular drugs

methyldopa, tab 250 mg ..... tab	500
hydralazine, inj. 20 mg/ml ..... ampoule	20

Dermatological drugs

polyvidone iodine 10 %, sol. [20] ..... 200 ml bottle	10
silver sulfadiazine cream 1% ..... 50 g tube	30
benzoic acid 6 % + salicylic acid 3 % ointment ..... 40 g tube	25
Recall from basic unit:	
tetracycline eye ointment, 1 % ..... (10 x 50) 500	
gentian violet, powder 25 g ..... (10 x 4) 40	
benzyl benzoate, lotion 25 %, litre ..... (10 x 1) 10	

Diuretics

furosemide, inj. 10 mg/ml ..... 2 ml / ampoule	20
hydrochlorothiazide, tab 25 mg ..... tab	200

Gastro-intestinal drugs

promethazine, tab 25 mg ..... tab	500
promethazine, inj. 25 mg/ml ..... 2 ml / ampoule	50
atropine, inj. 1 mg/ml ..... 1 ml / ampoule	50
Recall from basic unit :	
aluminium hydroxide, tab 500 mg ..... (10 x 1,000) 10,000	

Emergency contraceptives [21]

ethinylestradiol 50 micrograms + levonorgestrel 250 micrograms [22] ..... (pack of 4)	100

Oxytocics

oxytocin, inj. 10 IU/ml [23] ..... 1 ml/ampoule	200

Psychotherapeutic drugs

chlorpromazine, inj. 25 mg/ml ..... 2 ml/ampoule	20

[20] Polyvidone iodine has been chosen becase the use of iodine tincture in hot climates may result in toxic concentrations of iodine by partial evaporation of the alcohol.

[21] A small quantity of emergency contraceptives is included in the kit for victims of rape. It is acknowledged that cultural and religious beliefs may preclude some women and health workers from using this treatment. It is strongly recommended that health workers assist the victim as much as possible in reaching an informed decision.

[22] Women who seek help within 72 hours of rape and wish to use emergency contraception to prevent pregnancy should take two tablets of ethinylestradiol 50 micrograms + levonorgestrel 250 micrograms followed by two more tablets 12 hours later.

[23] For treatment and prevention of postpartum haemorrhage.

Respiratory tract, drugs acting on

salbutamol, tab 4 mg	tab	1,000
aminophylline, inj. 25 mg/ml	10 ml / ampoule	50
epinephrine (adrenaline), inj. 1 mg/ml	1 ml / ampoule	50

Solutions correcting water, electrolyte and acid-base disturbances [24)]

compound solution of sodium lactate (Ringer's lactate), inj. sol., with giving set and needle	500 ml / bag	200
glucose, inj. sol. 5 %, with giving set and needle [25)]	500 ml / bag	100
glucose, inj. sol. 50 %	10 ml / vial	20
water for injection	10 ml / plastic vial	2,000

Recall from basic unit:

ORS (oral rehydration salts)	*(10 x 200)*	*2,000*

Vitamins

retinol (vitamin A), caps 200,000 IU	caps	4,000
ascorbic acid, tab 250 mg	tab	4,000

Renewable supplies

scalp vein infusion set, disposable, 25G (diam. 0.5 mm)	unit	300
scalp vein infusion set, disposable, 21G (diam. 0.8 mm)	unit	100
IV placement canula, disposable, 18G (diam.1.7 mm)	unit	15
IV placement canula, disposable, 22G (diam.0.9 mm)	unit	15
needle Luer IV, disposable, 19G (diam.1.1 mm x 38 mm)	unit	1,000
needle Luer IM, disposable, 21G (diam.0.8 mm x 40 mm)	unit	2,000
needle Luer SC, disposable, 25G (diam.0.5 mm x 16 mm)	unit	100
spinal needle, disposable, 22G (diam.0.7 mm x 40 mm) black	unit	25
spinal needle, disposable, 20G (diam.0.9 mm x 90 mm) yellow	unit	25
syringe Luer resterilizable, nylon, 2 ml (diam.0.9 mm x 90 mm) [26)]	unit	20
syringe Luer resterilizable, nylon, 5 ml	unit	100
syringe Luer resterilizable, nylon, 10 ml	unit	40
syringe Luer, disposable, 2 ml	unit	400
syringe Luer, disposable, 5 ml	unit	500
syringe Luer, disposable, 10 ml	unit	200
syringe Luer conical connector (for feeding), 60 ml	unit	20
feeding tube, CH5 or 6 (premature baby), Luer tip, 40 cm, disposable	unit	20
feeding tube, CH8, Luer tip, 40 cm, disposable	unit	50
feeding tube, CH16, conical tip, 125 cm, disposable	unit	10
urinary catheter (Foley), n°12, disposable	unit	10
urinary catheter (Foley), n°14, disposable	unit	5
urinary catheter (Foley), n°18, disposable	unit	5

24) Because of the weight, the quantity of infusions included in the kit is minimal. Look for local supply, once in the field.

25) Glucose 5%, bag 500 ml, for administration of quinine by infusion.

26) There is increasing international agreement to promote the use of disposable syringes and needles, and resterilizable syringes are likely to be phased out in the future. Disposable syringes should be substituted by autodestruct single use syringes as soon as proven practicable products become commercially available.

surgical gloves sterile and resterilizable n°6.5 ....pair	50
surgical gloves sterile and resterilizable n°7.5 ....pair	150
surgical gloves sterile and resterilizable n°8.5 ....pair	50
safety box for disposal of used syringes and needles 5L [27]. ....unit	20
Recall from basic unit:	
Protective glove, examination, non sterile, disposable ....(100 units x 10) 1,000	
sterilization test tape (for autoclave) ....roll	2
sodium dichloroisocyanurate (NaDCC), tabs 1.67 g ....tab	1,200
thermometer, Celsius, clinical, flat type ....unit	10
spare bulb for otoscope ....unit	4
batteries R6 alkaline AA size (for otoscope) ....unit	12
Recall from basic unit:	
thermometer, Celsius, clinical, flat type ....(6 units x 10) 60	
ballpens ....(10 units x 10) 100	
hardcover exercise book ....(4 units x 10) 40	
health card + plastic cover ....(500 units x 10) 5,000	
plastic bag for drugs ....(2,000 units x 10) 20,000	
small notepads (A6) ....(10 units x 10) 100	
urine collecting bag with valve, 2000 ml ....unit	10
glove, examination, latex non sterile, large ....unit	100
glove, examination, latex non sterile, medium ....unit	100
glove, examination, latex non sterile, small ....unit	100
mucus extractor, disposable ....unit	5
suture, synthetic absorbable, braided, 70 cm metric size DEC.3 (USP 00),with cutting needle 3/8 circle, 30 mm ....(4 x 36 units)	144
surgical blade (surgical knives) n°22 for handle n°4 ....unit	50
tape umbilical non sterile 3 mm wide x 100 m spool ....unit	1
razor blade ....unit	100
tongue depressor (wooden), disposable ....unit	100
gauze roll 90 m x 0.90 m ....roll	3
gauze compresses 10 x 10 cm, 12 ply, sterile ....unit	1,000
Recall from basic unit:	
absorbent cotton wool ....(1 kg x 10) 10	
adhesive tape 2.5 cm x 5 m ....(30 rolls x 10) 300	
bar of soap (100-200 g/bar) ....(10 bars x 10) 100	
elastic bandage 7.5 cm x 5 m ....(20 units x 10) 200	
gauze bandage 7.5 cm x 10 m ....(100 rolls x 10) 1,000	
gauze compresses 10 x 10 cm, 12 ply, non sterile ....(500 units x 10) 5,000	

Equipment

apron, utility plastic reusable ....unit	2
clinical stethoscope, dual cup ....unit	4
obstetrical stethoscope (metal) ....unit	1
sheeting, plastic PVC clear 90 cm x 180 cm ....unit	1
sphygmomanometer (adult) ....unit	4
razor non disposable ....unit	2

[27] WHO/UNICEF standard E10/IC2: boxes should be prominently marked.

scale for adult	unit	1
scale hanging 25 kg x 100 g (Salter type) + trousers	unit	3
tape measure (cm/mm)	unit	5
tape measure, mid-upper arm circumference, MUAC (cm/mm)	unit	5
towel HUCK, 430 mm x 500 mm	unit	2
drum for compresses, lateral ellipses H : 10 cm, diam. 15 cm	unit	2
Recall from basic unit:		
drum for compresses, lateral ellipses H : 15 cm, diam. 15 cm	*(2 units x 10)*	*20*
otoscope + set of reusable paediatric specula	unit	2
tourniquet	unit	2
dressing tray, stainless steel, approximately 30 x 20 x 3 cm	unit	1
kidney dish, stainless steel, approximately 26 x 14 cm	unit	2
scissors straight/blunt, 12-14 cm	unit	2
forceps Kocher, no teeth, 12-14 cm	unit	2
Recall from basic unit:		
kidney dish, stainless steel, approximately 26 x 14 cm	*(1 unit x 10)*	*10*
gallipot, stainless steel, 100 ml	*(1 unit x 10)*	*10*
dressing tray, stainless steel, approximately 30 x 20 x 3 cm	*(1 unit x 10)*	*10*
scissors straight/blunt, 12-14 cm	*(2 units x 10)*	*20*
forceps Kocher, no teeth, 12-14 cm	*(2 units x 10)*	*20*
abcess/suture set (7 instruments + box) [28]	unit	2
dressing set (3 instruments + box) [29]	unit	5
delivery set [30]	unit	1
Recall from basic unit:		
Dressing set (3 instruments + box)	*(2 units x 10)*	*20*

[28] One suture set should be reserved for repair of postpartum vaginal tears.

Abscess/suture set (7 instruments + box):
- 1 stainless steel box approx. 20 x 10 x 5 cm
- 1 dissecting forceps with teeth, 12-14 cm
- 1 Kocher forceps with teeth, straight, 12-14 cm
- 1 Pean forceps straight, 12-14 cm
- 1 pair surgical scissors sharp/blunt, 12-14 cm
- 1 probe, 12-14 cm
- 1 Mayo-Hegar needle holder, 18 cm
- 1 handle scalpel, no 4

[29] Dressing set (3 instruments + box):
- 1 stainless steel box approx. 17 x 7 x 3 cm
- 1 pair surgical scissors sharp/blunt, 12-14 cm
- 1 Kocher forceps, no teeth, straight, 12-14 cm
- 1 dissecting forceps, no teeth, 12-14 cm

[30] Delivery set (3 instruments + box):
- 1 stainless steel box approx. 20 x 7 x 3 cm
- 1 scissors straight 14-15 cm B/B SS
- 1 scissors dissecting straight Mayo 16-18 cm SS
- 1 forceps haemostat straight Rochester Pean 15-17 cm SS

pressure sterilizer, 15 litres (type : Prestige 7503, double rack) .....unit	1
pressure sterilizer, 21 litres with basket .....unit	1
kerosene stove, single burner, tank capacity 1-2 litres (type UNICEF 017.0000) .....unit	2
water filter with candles, 10-20 litres (type UNICEF 561.9902).....unit	3
nail brush, plastic, autoclavable.....unit	2
Recall from basic unit:	
plastic bottle, 1 litre.....*(3 units x 10) 30*	
syringe Luer, disposable, 10 ml.....*(1 unit x 10) 10*	
plastic bottle, 125 ml.....*(1 unit x 10) 10*	
nail brush, plastic, autoclavable.....*(2 units x 10) 20*	
bucket, plastic, 12 litres.....*(2 units x 10) 20*	
foldable jerrycan, 20 litres.....*(1 unit x 10) 10*	
MSF clinical guidelines (diagnostic and treatment manual) .....unit	2

31) *Clinical guidelines - diagnostic and treatment manual* is available at cost price in English, French and Spanish from Médecins Sans Frontières.

Annex 2

Assessment and treatment of diarrhoea

Annex 2a: Assessment of diarrhoeal patients for dehydration

First assess your patient for dehydration			
	A	**B**	**C**
1. **Look at:** general condition	well, alert	***restless, irritable***	***lethargic or unconscious; floppy***
eyes [32)]	normal	sunken	very sunken and dry
tears	present	absent	absent
mouth and tongue [33)]	moist	dry	very dry
thirst	drinks normally, not thirsty	***thirsty, drinks eagerly***	***drinks poorly or not able to drink***
2. **Feel:** skin pinch [34)]	goes back quickly	***goes back slowly***	***goes back very slowly***
3. **Decide:**	The patient has **no** *sign of dehydration*	If the patient has two or more signs, including at least one ***sign***, there is *some dehydration*	If the patient has two or more signs, including at least one ***sign***, there is *severe dehydration*
4. **Treat:**	Use Treatment plan A	Weigh the patient, if possible, and use Treatment plan B	Weigh the patient and use Treatment plan C urgently

Source: WHO. *The treatment of diarrhoea, a manual for physicians and other senior health workers.* Geneva: World Health Organization; 1995. WHO/CRR/95.3

32) In some infants and children the eyes normally appear somewhat sunken. It is helpful to ask the mother if the child's eyes are normal or more sunken than usual.

33) Dryness of the mouth and tongue can also be palpated with a clean finger. The mouth may always be dry in a child who habitually breathes through the mouth. The mouth may be wet in a dehydrated patient owing to recent vomiting or drinking.

34) The skin pinch is less useful in infants or children with marasmus (severe wasting) or kwashiorkor (severe undernutrition with œdema), or obese children.

Annex 2b: Treatment Plan A to treat diarrhoea at home

Use this plan to teach the mother to:

- Continue to treat at home her child's current episode of diarrhoea.
- Give early treatment for future episodes of diarrhoea.

Explain the three rules for treating diarrhoea at home:

1. Give the child more fluids than usual to prevent dehydration

- Use recommended home fluids. These include: ORS solution, food-based fluids (such as soup, rice water and yogurt drinks) and plain water. Use ORS solution for children described in the box below. (Note: if the child is under 6 months and not yet taking solid food, give ORS solution or water rather than food-based fluid).
- Give as much of these fluids as the child will take. Use the amounts shown below for ORS as a guide.
- Continue giving these fluids until the diarrhoea stops.

2. Give the child plenty of food to prevent undernutrition

- Continue to breast-feed frequently.
- If the child is not breast-fed, give the usual milk.
- If the child is six months or older, or already taking solid food:
  - also give cereal or another starchy food mixed, if possible, with pulses, vegetables, and meat or fish; add 1 or 2 teaspoonfuls of vegetable oil to each serving;
  - give fresh fruit juice or mashed banana to provide potassium;
  - give freshly prepared foods; cook and mash or grind food well;
  - encourage the child to eat: offer food at least 6 times a day;
  - give the same food after diarrhoea stops, and give an extra meal each day for two weeks.

3. Take the child to the health worker if the child does not get better in 3 days or develops any of the following:

- many watery stools
- repeated vomiting
- marked thirst
- eating or drinking poorly
- fever
- blood in the stool

Children should be given ORS solutions at home if:

- they have been on Treatment Plan B or C;
- they cannot return to the health worker if the diarrhoea gets worse;
- it is national policy to give ORS to all children who see a health worker for diarrhoea.

If the child will be given ORS solution at home, show the mother how much ORS to give after each loose stool and give her enough packets for 2 days.

Age	Amount of ORS to give after each loose stool	Amount of ORS to provide for use at home
Less than 24 months	50-100 ml	500 ml/day
2 up to 10 years	100-200 ml	1,000 ml/day
10 years or more	As much as wanted	2,000 ml/day

- Describe and show the amount to be given after each stool using a local measure.

Show the mother how to mix ORS.

Show her how to give ORS.

- Give a teaspoonful every 1-2 minutes for a child under 2 years.
- Give frequent sips from a cup for an older child.
- If the child vomits, wait 10 minutes. Then give the solution more slowly (for example, a spoonful every 2-3 minutes).
- If diarrhoea continues after the ORS packets are used up, tell the mother to give other fluids as described in the first rule above or return for more ORS.

Annex 2c: Treatment Plan B to treat dehydration

Approximate amount of ORS solution to give in the first 4 hours						
Age*	Less than 4 months	4-11 months	12-23 months	2-4 years	5-14 years	15 years or older
Weight	less than 5 kg	5-7,9 kg	8-10,9 kg	11-15,9 kg	16-29,9 kg	30 kg or more
In ml	200-400	400-600	600-800	800-1200	1200-2200	2200-4000
In local measure						

* Use the patient's age only when you do not know the weight. The approximate amount of ORS required (in ml) can also be calculated by multiplying the patient's weight (in grams) times 0.075.

- If the child wants more ORS than shown, give more.
- Encourage the mother to continue breast-feeding.
- For infants under 6 months who are not breast-fed, also give 100-200 ml clean water during this period.

Observe the child carefully and help the mother give ORS solution.

- Show her how much solution to give the child.
- Show her how to give it – a teaspoonful every 1-2 minutes for a child under 2 years, frequent sips from a cup for an older child.
- Check from time to time to see if there are problems.
- If the child vomits, wait 10 minutes and then continue giving ORS, but more slowly, for example, a spoonful every 2-3 minutes.
- If the child's eyelids become puffy, stop the ORS and give plain water or breast milk. Give ORS according to Plan A when the puffiness is gone.

After 4 hours, reassess the child using the assessment chart, then select Plan A, B or C to continue treatment.

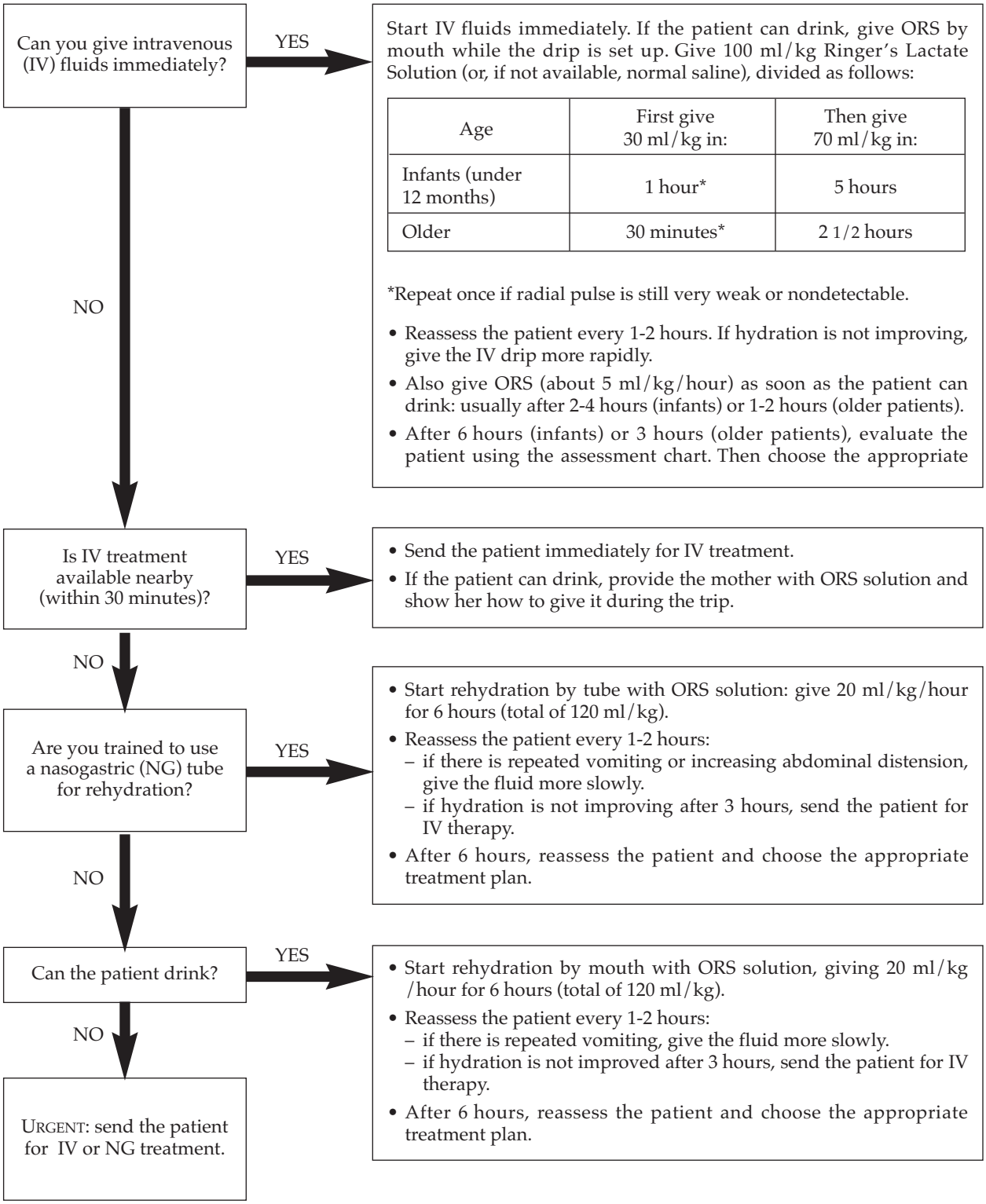
- If there are no signs of dehydration, shift to Plan A. When dehydration has been corrected, the child usually passes urine and may also be tired and fall asleep.
- If signs indicating some dehydration are still present, repeat Plan B, but start to offer food, milk and juice as described in Plan A.
- If signs indicating severe dehydration have appeared, shift to Plan C.

If the mother must leave before completing Treatment Plan B:

- Show her how much ORS to give to finish the 4-hour treatment at home;
- Give her enough ORS packets to complete rehydation, and for 2 more days as shown in Plan A;
- Show her how to prepare ORS solution;
- Explain to her the three rules in Plan A for treating her child at home:
  - to give ORS or other fluids until diarrhoea stops;
  - to feed the child;
  - to bring the child back to the health worker, if necessary.

Annex 2d: Treatment Plan C to treat severe dehydration quickly

Follow the arrows. If the answer is "yes", go across. If "no", go down.



NB: If possible, observe the patient at least 6 hours after rehydration to be sure the mother can maintain hydration giving ORS solution by mouth. If the patient is above 2 years and there is cholera in your area, give an appropriate oral antibiotic after the patient is alert.

Use of drugs for children with diarrhoea

- ANTIBIOTICS should ONLY be used for dysentery and for suspected cholera cases with severe dehydration. Otherwise they are ineffective and should NOT be given.
- ANTIPARASITIC drugs should ONLY be used for:
  - Amoebiasis, after antibiotic treatment of bloody diarrhoea for **shigella** has failed or trophozoites of ***E. histolytica*** containing red blood cells are seen in the faeces.
  - **Giardiasis**, when diarrhoea has lasted at least 14 days **and** cysts or trophozoites of Giardia are seen in faeces or small bowel fluid.
- ANTIDIARRHOEAL DRUGS and ANTIEMETICS should NEVER be used. None has proven value and some are dangerous.

Annex 5

Sample health card

HEALTH CARD
CARTE DE SANTÉ

CARD No.
CARTE No.

DATE OF REGISTRATION
DATE D'ENREGISTREMENT

SITE
LIEU

SECTION/HOUSE No.
SECTION/HABITATION No.

DATE OF ARRIVAL AT SITE
DATE D'ARRIVÉE SUR LE LIEU

FAMILY NAME
NOM DE FAMILLE

GIVEN NAMES
PRENOMS

DATE OF BIRTH
DATE DE NAISSANCE

OR
OU

YEARS
ANS

SEX
SEXE

M/F

NAME COMMONLY KNOWN BY
NOM D'USAGE HABITUEL

CHILD'S NAME

MOTHER'S NAME
NOM DE LA MÈRE

FATHER'S NAME
NOM DU PÈRE

HEIGHT
TAILLE

CM

WEIGHT
POIDS

KG

PERCENTAGE WEIGHT/HEIGHT
POURCENTAGE POIDS/TAILLE

FEEDING PROGRAMME
PROGRAMME D'ALIMENTATION

IMMUNIZATION
IMMUNISATION

MEASLES
ROUGEOLE

DATE

1

2

BCG

DATE

OTHERS
AUTRES

POLIO 0

DATE

DPT POLIO
DTC POLIO

DATE

1

2

3

WOMEN'S NEEDS

PREGNANT
ENCEINTE

YES/NO
OUI/NON

No. OF PREGNANCIES
No. DE GROSSESSES

No. OF CHILDREN
No. D'ENFANTS

LACTATING
ALLAITANTE

YES/NO
OUI/NON

TETANUS
TÉTANOS

DATE

1

2

3

4

5

FEEDING PROGRAMME
PROGRAMME D'ALIMENTATION

OBSERVATIONS

GENERAL (Family circumstances, living conditions, etc.)
GENERALES (Circonstances familiales, conditions de vie, etc.)

HEALTH (Brief history, present condition)
MEDICALES (Bref résumé de l'état actuel)

DATE			CONDITION (Signs/symptoms/diagnosis) ETAT (Signes/symptômes/diagnostic)	TREATMENT (Medication/dose time) TRAITEMENT (Médication/durée de la dose)	COURSES (Medication due given) APPLICATION (Médication requise effectuée)	OBSERVATIONS (Change in condition) NAME OF HEALTH WORKER OBSERVATIONS (Changement d'état) NOM DE L'AGENT DE SANTÉ

Writing medical certificates in the event of sexual violence

Physicians are often the first to be confronted with the consequences of violence. Victims are sometimes afraid to report to the authorities concerned, particularly when the population affected is vulnerable (refugees, prisoners, civilian victims of war etc.). In such a situation, the physician should try to determine if the event was isolated or part of larger scale violence (e.g. systematic rape).

Faced with sexual violence, the physician is obliged to complete a medical certificate for the benefit of the victim, irrespective of the country in which (s)he is practising.
The certificate is *individual* (for the benefit of the individual or their beneficiaries) and *confidential* (it falls within professional confidentiality). The examples of certificates presented in the following pages are written for *sexual violence*, but the approach is the same for *all forms of intentional violence*.

All medical certificates must include:
– The identity of the signing physician.
– The identity of the victim (except for certificates passed on to HCR or to ICRC *without the consent of the victim*, see below).
– The complete date and the time of the examination.
– The statement of the victim *in his/her own words*.
– The findings of the clinical examination.
– The samples taken and the examinations carried out.
– A conclusion (including, if possible, the length of Total Temporary Incapacity (TTI) and anticipated Partial Permanent Incapacity (PPI)).

Notes:
- The name of the victim (except for certificates passed on to HCR or to ICRC *without the consent of the victim*, see below), the name of the physician and his/her signature, as well as the date of the examination must appear on each page.
- A copy containing the victim's name is given *to the victim for future legal use*. Keep a copy of the medical certificate (or, if the case should arise, of the mandatory report[1]) in the patient record, archived to allow future authentication of the certificate given to the victim.

What the practitioner should not do:
– Rephrase the words of the victim as the practitioner's own.
– Endorse the identity of the aggressor nor the nature of the crime, this must be left to the legal authorities.
– Conclude that there was no sexual violence in the absence of lesions on clinical examination.

Examples of medical certificates for adults and children (see following pages).

With the consent of the victim, the physician gives a copy of the certificate containing the victim's name:
– to HCR (to the protection officer only) if the victim is a refugee or displaced, so that protection measures may be put in place for the individual;
– to ICRC if the victim is a victim of war or a prisoner.

Without the consent of the victim, the physician may give a copy of the certificate to HCR or ICRC, but without revealing the identity of the victim (concretely, the sections "family name, first name and precise address" should not appear).

[1] In principle, legal reporting of sexual violence against children under 15 years is mandatory. The only exception is if there is a risk that reporting may further harm the situation of the child. Consider each case individually.

Medical certificate for an adult

I, the undersigned, ... (family name, first name), **doctor of medicine**, **certify that I have examined on this the** ..... (hour, day, month, year), **at his/her request**, **Mr, Mrs, Miss** ..... (family name, first name), **born on the** ..... (day, month, year), **living at** .... (precise address).

(S)he declares that (s)he has been the victim of sexual violence on ..... (hour, day, month, year) **at** ..... (place), **by** ..... (aggressor known or unknown).

During the interview, (s)he stated:
" ..... "

Mr, Mrs, Miss ..... **presents the following clinical signs:**

– **On general examination:** .....
(describe the behaviour: prostrated, excited, calm, frightened, mute, tearful, etc.)

– **On somatic examination:** .....
(describe precisely all lesions observed on the entire body: signs of abrasion, cuts, scratches, bites, strangulation, swelling, burns etc. Indicate the site, the extent, the number, the character (old or recent), the severity etc.)

– **On genital examination:** .....
(is the hymen intact or not (if not, did it occur recently or in the past), traumatic lesions etc.)

– **On anal examination:** .....
(detectable traumatic lesions etc.)

– **Examinations completed** (particularly samples taken)**:** .....

– **Evaluate the risk of pregnancy:** .....

In conclusion, Mr, Mrs, Miss ..... **shows (or does not show) signs of recent violence and an emotional response (in)compatible with the violence of which (s)he reports to have been victim.**
(Remember: the absence of lesions does not allow a conclusion that there was no sexual violence).

Total Temporary Incapacity (TTI) should be granted for ..... **days without consideration of possible complications.**
Sequelae may persist leaving a Partial Permanent Incapacity (PPI) to be assessed by an expert at a future date.

This document is established with the consent of the patient and may be used for legal purpose.

Signature of physician

Medical certificate for a child

I, the undersigned, ... (family name, first name), **doctor of medicine, certify that I have examined on this the** ..... (hour, day, month, year), **at the request of** ..... (father, mother, legal representative), **the child** ..... (family name, first name), **born on the** ..... (day, month, year), **living at** .....
..... (precise address of the parents or residence of the child).

During the interview, the child told me:
" ..... "
(quote as faithfully as possible the words of the child without interpreting them)

During the interview, ... (name of the person accompanying the child) **stated:**
" ..... "

This child presents the following clinical signs:

– **On general examination:** .....
((describe the behaviour: prostrated, excited, calm, frightened, mute, tearful, etc.)

– **On somatic examination:** .....
(describe precisely all lesions observed on the entire body: signs of abrasion, cuts, scratches, bites, strangulation, swelling, burns etc. Indicate the site, the extent, the number, the character (old or recent), the severity etc.)

– **On genital examination:** .....
(is the hymen intact or not (if not, did it occur recently or in the past), traumatic lesions, genital infection etc.)

– **On anal examination:** .....
(detectable traumatic lesions etc.)

– **Examinations completed** (particularly samples taken)**:** .....

– **Evaluate the risk of pregnancy:** .....

In conclusion, this child shows (or does not show) signs of recent violence and an emotional response (in)compatible with the violence of which (s)he reports to have been victim.
(Remember: the absence of lesions does not allow a conclusion that there was no sexual violence).

Total Temporary Incapacity (TTI) should be granted for ..... **days without consideration of possible complications.**
Sequelae may persist leaving a Partial Permanent Incapacity (PPI) to be assessed by an expert at a future date.

This document is established with the consent of ..... (father, mother or legal representative) **and may be used for legal purpose.**

Signature of physician

List of the drugs mentioned in this guide, including the International Nonproprietary Names (INN)

as well as the most common synonyms and proprietary names

Aciclovir: Viratup®, Zovirax®

Acetylsalicylic acid = ASA = aspirin

Albendazole: Eskazole®, Zentel®

Aluminium hydroxide: Maalox®

Aminophylline

Amitriptyline: Elavil®, Laroxyl®, Triptyzol®

Amodiaquine: Camoquin®, Flavoquine®

Amoxicillin: Amoxil®, Clamoxyl®

Amoxicillin + clavulanic acid = co-amoxiclav: Augmentin®

Amphotericin B: Fungizone®

Amphotericin B liposomal: AmBisome®

Ampicillin: Pentrexyl®

Artemether: Paluther®

Artemether + lumefantrine = coartemether: Coartem®, Riamet®

Artesunate: Arsumax®, Plasmotrim®

Ascorbic acid = vitamin C: Laroscorbine®, Vitascorbol®

Atenolol: Tenormin®

Azithromycin: Zithromax®

BCG vaccine

Beclometasone: Beclazone®, Becotide®

Benzathine benzylpenicillin: Extencilline®, Penadur®, Penidural®

Benzylpenicillin = penicillin G: Crystapen®, Penilevel®

Benzylpenicillin procaine = penicillin G procaine: Depocillin®, Duracillin®

Benzylpenicillin procaine + benzylpenicillin = Fortified penicillin procaine: Bicillin®

Benznidazole: Radanil®

Benzyl benzoate: Ascabiol®

Biperiden: Akineton®

Bisacodyl: Dulco-lax®

Bithionol: Bitin®

Buprenorphine: Buprenex®, Temgesic®

Calcium gluconate

Captopril: Capoten®, Lopril®

Carbamazepine: Tegretal®, Tegretol®

Cefixime: Suprax®

Ceftriaxone: Rocephin®

Chloramine: Clonazone®, Hydroclonazone®

Chloramphenicol: Chloromycetin®, Kemicetine®

Chloramphenicol (long-acting oily)

Chlorhexidine + cetrimide: HAC®, Hibicet®

Chloroquine: Nivaquine®

Chlorphenamine = chlorpheniramine: Teldrin®, Trimeton®

Chlorpromazine: Largactil®, Megaphen®, Thorazine®

Cimetidine: Tagamet®

Ciprofloxacin: Ciflox®

Clindamycin: Dalacin®

Clofazimine: Lamprene®

Clomipramine: Anafranil®

Cloxacillin: Cloxapen®, Orbenin®

Codeine

Cotrimoxazole = sulfamethoxazole + trimethoprim: Bactrim®

Dapsone: Avlosulfon®, Disulone®

Dexamethasone

Dextropropoxyphene: Antalvic®, Depronal®

Diazepam: Valium®

Diclofenac: Cataflam®, Voltaren®

Didanosine = ddI: Videx®

Diethylcarbamazine: Banocide®, Hetrazan®, Notezine®

Digoxin: Coragoxine®, Lanoxin®

Diphtheria-Tetanus-Pertussis vaccine

Dopamine: Dynatra®, Intropin®

Doxycycline: Vibramycin®

Efavirenz: Stocrin®, Sustiva®

Enalapril: Renitec®

Epinephrine = adrenaline

Ergocalciferol = vitamin D2

Erythromycin: Erythrocin®, Pantomicina®, Propiocine®

Ethambutol: Dexambutol®, Myambutol®

Ferrous salts (sulphate or fumarate)

Fluconazole: Triflucan®

Fluoxetine: Fluctine®, Prozac®

Folic acid = vitamin B9

Folinic acid: Refolinon®

Furosemide = frusemide: Lasilix®, Lasix®, Seguril®

Gelatin (fluid, modified): Gelofusine®, Plasmion®

Gentamicin: Genticin®

Gentian violet = crystal violet = GV

Glyceryl trinitrate = nitroglycerin = trinitrin

Griseofulvin: Fulcine®, Grisefuline®, Grisovin®

Haloperidol: Haldol®, Serenace®

Hepatitis B vaccine

Hydralazine: Apresoline®

Hydrochlorothiazide: Esidrex®, HydroSaluric®

Hydrocortisone: Efcortesol®, Cortagen®, Solu-cortef®

Hyoscine butylbromide = butylscopolamine: Buscopan®

Ibuprofen: Advil®, Brufen®, Nureflex®

Indometacin: Artracin®, Inacid®, Indocid®

Indinavir: Crixivan®

Iodine (iodised oil) : Lipiodol®

Isoniazid = INH: Cemidon®, Rimifon®

Itraconazole: Sporanox®

Ivermectin: Mectizan®, Stromectol®

Japonese Encephalitis vaccine

Ketamine: Ketalar®, Ketanest®

Ketoconazole cream: Nizoral®

Lamivudine = 3TC: Epivir®, Lamivir®

Lidocaine = lignocaine: Xylocaine®

Loperamide: Imodium®, Imosec®

Magnesium sulphate

Malathion: Prioderm®

Measles vaccine

Mebendazole: Pantelmin®, Vermox®, Wormin®

Mefloquine: Lariam®

Meglumine antimoniate: Glucantime®

Melarsoprol: Arsobal®

Meningococcal A+C vaccine

Meningococcal A+C+W135 vaccine

Methylergometrine: Methergin®

Metoclopramide: Primperan®

Metronidazole: Flagyl®

Miconazole muco-adhesive: Tibozole®

Minocycline: Minocin®

Modified fluid gelatin: Gelofusine®, Plasmion®

Morphine

Morphine (immediate-release): Sevredol®

Morphine (sustained-release): Kapanol®

Nalbuphine: Nubain®

Naloxone: Nalone®, Narcan®

Nelfinavir: Viracept®

Nevirapine: Neravir®, Nevimune®, Viramune®

Niclosamide: Tredemine®, Yomesan®

Nicotinamide = vitamin PP = vitamin B3: Nicobion®

Nifedipine: Adalat®

Nifurtimox: Lampit®

Nitrofurantoin: Furadantin®

Norethisterone: Noristerat®

Nystatin: Mycostatin®, Nystan®

Omeprazole: Mopral®

Oral rehydration salts = ORS

Oxamniquine: Vansil®

Oxytocin: Syntocinon®

Paracetamol = acetaminophen: Doliprane®, Panadol®

Paromomycin = aminosidin: Humatin®, Gabbroral®

Pentamidine: Pentacarinat®, Pentam®

Pentazocine: Fortal®, Talwin®

Permethrin: Lyclear®

Pethidine = meperidine: Demerol®, Dolosal®

Phenobarbital: Gardenal®, Luminal®

Phenoxymethylpenicillin = penicillin V: Oracilline®, Ospen®

Phenytoin: Di-hydran®, Dilantin®, Epanutin®

Phytomenadione = vitamin K1

Podophyllotoxin: Condyline®, Condylox®, Wartec®

Poliomyelitis vaccine (oral)

Polygeline: Haemaccel®

Polyvidone iodine = povidone iodine: Betadine®

Potassium chloride: Kaleorid®

Praziquantel: Biltricide®, Cysticide®

Prednisone and prednisolone: Cortancyl®, Solupred®

Promethazine: Phenergan®

Pyrazinamide: Zinamide®

Pyridoxine = vitamin B6: Hexobion®, Pyroxin®

Pyrimethamine: Daraprim®, Malocide®

Quinine

Rabies immunoglobulin

Rabies vaccine

ReSoMal = ORS formula for severely malnourished children

Retinol = vitamin A

Ribavirine: Rebetol®, Virazole®

Rifampicin: Rifadin®

Ringer lactate = Hartmann's solution

Ritonavir: Norvir®

Salbutamol = albuterol: Salbulin®, Ventolin®

Saquinavir: Invirase®, Fortovase®

Silver sulfadiazine: Flamazine®

Sodium stibogluconate: Pentostam®

Sodium valproate = valproic acid: Convulex®, Depakine®, Epilim®

Spectinomycin: Stanilo®, Trobicin®

Spironolactone: Aldactone®, Spiroctan®

Stavudine = d4T: Stavir®, Zerit®, Zeritavir®

Streptomycin

Sulfadiazine: Adiazine®

Sulfadoxine + pyrimethamine: Fansidar®

Suramin: Germanin®, Moranyl®

Tetanus immunoglobulin

Tetanus vaccine

Tetracycline eye ointment

Thiamine = vitamin B1 : Benerva®, Betaxin®

Thioacetazone = TB1

Tinidazole: Fasigyn®

Tramadol: Tramal®, Zamadol®, Zydol®

Triclabendazole: Egaten®, Fasinex®

Valproic acid = sodium valproate: Convulex®, Depakine®, Epilim®

Vitamin A = retinol

Whitfield ointment or benzoic acid 6% + salicylic acid 3% ointment

Yellow fever vaccine

Zidovudine: Retrovir®

Zinc sulfate

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