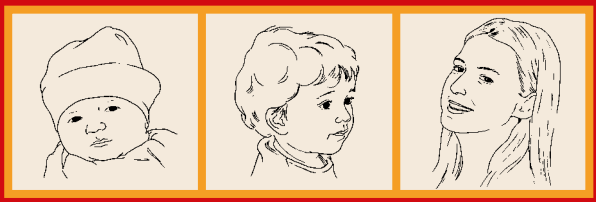
POCKET BOOK
OF

Primary health care for children and adolescents



GUIDELINES FOR HEALTH PROMOTION, DISEASE PREVENTION AND MANAGEMENT

from the newborn period to adolescence

World Health Organization
REGIONAL OFFICE FOR Europe

Paediatric life support algorithm

Safety of rescuer and child – **Stimulate** the child – **Shout** for help

Airway

Open airway (p. 720)

If cervical spine injury possible, immobilize the neck and use jaw thrust

Remove any obvious airway obstruction

Consider oropharyngeal airway (p. 721).

Breathing

Breathing normally?

Look, listen, feel for breathing

YES → **Continue with ABCDE approach** (p. 716)

NO – or only occasional gasps

5 initial rescue breaths (p. 722)

Use bag-valve mask (100% O_2 10 L/min)

Each breath for 1 s, make the chest rise.

Circulation

Signs of life?

Cough? Any movements? Pulse?

YES → **Continue rescue breathing** (ventilation) (p. 722)

NO

Reassess every 2 minutes

15 chest compressions (p. 724)

Lower half of the sternum 100–120/min

1/3 of anteroposterior chest dimension

2 rescue breaths

Continue 15 compressions: 2 breaths

IV/IO access: epinephrine (adrenaline) 0.01 mg/kg every 3–5 min

Organize emergency transport to hospital*

! Treat **reversible** causes of respiratory and cardiac arrest (p. 715)
Re-assess regularly – Keep child **warm**

* Maintain required level of life support until the emergency team arrives. If you are the most experienced health care provider you must accompany the child to the hospital.

Note: this algorithm is applicable to children of all ages except for newborns at birth.

ABCDE approach

Quick look

Responsive? **If unresponsive** → Follow *paediatric life support* algorithm (p. 718)

- Stay calm. Call for **help**. Keep the child **calm/comfortable/warm**.
- **Treat life-threatening problems** before continuing the assessment.

ASSESS — TREAT

Airway and Breathing

↘ *If a cervical spine injury is possible,* ***do not*** *move neck*, immobilize the neck and use jaw thrust to open the airway.

- Obstructed breathing
- Central cyanosis or SpO_2 < 94%
- Respiratory distress:
  - fast breathing
  - chest indrawing
  - obstructed/noisy (stridor, wheeze) or gasping.

IF POSITIVE

If foreign body aspirated:
- Manage airway in choking child (p. 719).

If no foreign body aspirated:
- Manage the airway (p. 720).
- Give oxygen (p. 723).
- Continue management of **Severe respiratory distress** (p. 729).

Circulation

- Shock:
  - cold extremities +
  - weak and fast pulse +
  - capillary refill time > 2 s
- Severe dehydration:
  - lethargy
  - sunken eyes
  - slow return after pinching skin.

IF POSITIVE

- Stop any bleeding (p. 744).
- Give oxygen (p. 723).
- Give IV fluids if not contraindicated (p. 725).
- Continue management of **Shock** (p. 733).

Disability

↘ Determine the level of consciousness with the AVPU method: **a**lert, responds to **v**oice, responds to **p**ain, **u**nresponsive?

- Lethargy (not alert, but responsive to voice or pain)
- Coma (unresponsive to pain)
- Convulsions
- Low blood glucose (< 3 mmol/L or < 54 mg/dL).

IF POSITIVE

- If unconscious, A and B stable and no neck trauma: place in recovery position (p. 726).
- If convulsing, give rectal diazepam (p. 727).
- If low blood glucose, give glucose (p. 728).
- Continue management of **Lethargy or coma** (p. 737).

Exposure

↘ Expose and examine the child fully:

- Injuries, bites or burns
- Rash (non-blanching)
- Abdominal distension
- Temperature.

IF POSITIVE

- Remove tight clothing.
- Manage body temperature.
- Treat pain (p. 508).
- Manage
  - Trauma (p. 741).
  - Burns (p. 745).
  - Poisoning (p. 748).
  - Envenoming (p. 753).
  - Drowning (p. 756).
  - Electrocution (p.757).
  - Acute abdomen (p. 758).

SAMPLE approach

↘ Take history rapidly:

- **S**igns and symptoms (fever, abdominal pain)
- **A**llergies
- **M**edications
- **P**ast medical history
- **L**ast oral intake
- **E**vents surrounding illness (poisoning, envenoming).

Further management

- Reassess regularly for signs of improvement or deterioration.
- Monitor **vital signs**: respiration rate, heart rate, blood pressure, oxygen saturation (SpO_2), temperature.
- Only when ABCD are stable, undertake a head-to-toe examination.
- Organize rapid transfer to hospital. Maintain required level of monitoring and management until the emergency team arrives. If you are the most experienced health care provider you may have to accompany the child to the hospital.

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Primary health care for children and adolescents

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DISEASE PREVENTION AND MANAGEMENT
from the newborn period to adolescence

UNITED ACTION for BETTER HEALTH

World Health Organization
REGIONAL OFFICE FOR Europe

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Foreword

by the Regional Director

Primary health care is a pillar of universal health coverage and guarantor of quality health care for all. Providing a continuum of health care for children and adolescents should be at the core of service delivery to the community. Unfortunately, the care children and adolescents receive at the primary health care level is – for several reasons – not always optimal: health care providers do not always have the requisite training, resources and support to provide care which is both evidence-based and in the best interests of the child or adolescent.

This *Pocket Book* aims to close this gap: it provides up-to-date guidance for the management of common conditions which primary health care providers encounter when they care for children and adolescents. It also includes information on conditions generally managed by specialists so that primary health care providers can coordinate the routine care of children and adolescents with complex or chronic conditions.

This *Pocket Book* sets out to promote a holistic view of the health, growth and development of children and adolescents up to 18 years of age. Its focus is therefore on health promotion, disease prevention, early risk factor management and monitoring of chronic conditions. Preventive and promotive measures from the newborn period to adolescence include information on the timing and content of well-child visits, guidance on breastfeeding and the introduction of complementary foods, promotion of early childhood development and health messages for adolescents. All of these topics summarize information from existing evidence-based WHO guidelines.

This *Pocket Book* is for use by doctors, nurses and other health professionals who are responsible for the care of children and adolescents at the primary health care level in the WHO European Region. Its recommendations are widely applicable and may be adapted by countries to suit their own specific circumstances with the support of the WHO Regional Office for Europe. It enables health care providers to deliver on the promise of quality primary

health care: the focus on evidence-based practices and prevention ensures that children and adolescents receive the care they need and prevents unnecessary treatment and hospitalization.

Primary health care is the most inclusive, effective and efficient approach to enhance both the physical and mental health, and social health and well-being, of everyone in the community, leaving no one behind. It is the cornerstone of any high-quality sustainable system for universal health coverage and the health-related Sustainable Development Goals, and has become a historical reference thanks to the Declaration of Alma-Ata and the Declaration of Astana. Addressing the way children and adolescents experience primary health care is the central inspiration of this Pocket Book and will do much to underpin WHO's European Programme of Work to help countries better protect their children's health.

Dr Hans Henri P. Kluge
WHO Regional Director for Europe

Abbreviations

ABCDE	airway, breathing, circulation, disability, exposure
ADHD	attention deficit hyperactivity disorder
Ag	antigen
AIDS	acquired immunodeficiency syndrome
ALT	alanine transaminase
APGAR	appearance, pulse, grimace, activity, respiration
ART	antiretroviral therapy
ARV	antiretroviral (medicines)
ASD	autism spectrum disorder
ASO	antistreptolysin O (titre)
AST	aspartate transaminase
AVPU	alert, responding to voice, responding to pain, unconscious
BCG	bacille Calmette-Guérin (vaccine)
BMI	body mass index
BMR	basal metabolic rate
bpm	beats per minute
CAT	computerized axial tomography
CMV	cytomegalovirus
COVID-19	coronavirus disease 2019
CRC	Convention on the Rights of the Child
CRP	C-reactive protein
CSF	cerebrospinal fluid
DTP	diphtheria-tetanus-pertussis (vaccine)
EBV	Epstein-Barr virus
ECG	electrocardiogram
EEG	electroencephalography
ELISA	enzyme-linked immunosorbent assay

ENT	ear, nose and throat (specialist)
ESR	erythrocyte sedimentation rate
HAV	hepatitis A virus
Hb	haemoglobin
HbA1c	haemoglobin A1c (glycated haemoglobin)
antiHBc	hepatitis B core antibody
HBsAg	hepatitis B surface antigen
HBV	hepatitis B virus
HEEADSSSS	home, education/employment, eating habits, activities, drugs, sexuality, suicide and mental health, security, social media
HIV	human immunodeficiency virus
HLA	human leukocyte antigen
HPV	human papillomavirus
HSV	herpes simplex virus
HUS	haemolytic uraemic syndrome
ICS	inhaled corticosteroids
ICTs	information communication technologies
Ig	immunoglobin (IgA, IgD, IgE, IgG, IgM)
IM	intramuscular (injection), intramuscularly
IU	international units
IUD	intrauterine device
IV	intravenous (injection), intravenously
KMC	kangaroo mother care
LABA	long-acting beta2 agonist
MCHC	mean corpuscular haemoglobin concentration
MCV	mean corpuscular volume
MDI	metered dose inhaler
MERS	Middle East respiratory syndrome
MIS-C	multisystem inflammatory syndrome temporally associated with COVID-19 in children and adolescents
MMR	measles-mumps-rubella (vaccine)
MRI	magnetic resonance imaging
NAATs	nucleic acid amplification tests
NCDs	noncommunicable diseases
NNRTI	non-nucleoside reverse transcriptase inhibitor
NRTI	nucleoside reverse transcriptase inhibitor

ORS	oral rehydration solution
PCR	polymerase chain reaction
PEP	post-exposure prophylaxis
PPE	personal protective equipment
PT	prothrombin time
PTSD	post-traumatic stress syndrome
PTT	partial thromboplastin time
RBCs	red blood cells
RSV	respiratory syncytial virus
RT-PCR	reverse transcription polymerase chain reaction
SABA	short-acting beta-agonist
SARS	severe acute respiratory syndrome
SC	subcutaneous (injection), subcutaneously
SD	standard deviation
SIDS	sudden infant death syndrome
sp., spp.	species (singular and plural)
SpO_2	oxygen saturation
STI	sexually transmitted infection
TB	tuberculosis
TSH	thyroid stimulating hormone
UNICEF	United Nations Children's Fund
UTI	urinary tract infection
VZV	varicella zoster virus
WBC	white blood cell (count)
WHO	World Health Organization

■ diagnostic sign or symptom

▶ treatment recommendation or action point

counselling box

CHAPTER 1

Providing care from birth through adolescence

1.1 The role of the primary health care provider

Prevention and promotion

Primary health care providers play a vital role in the early detection and treatment of diseases, but also in achieving positive health outcomes through health promotion and prevention of diseases and developmental difficulties.

During every visit, the primary health care provider can:

- Provide children, adolescents and their parents or caregivers with important counselling messages
- Initiate interventions to prevent diseases and developmental difficulties
- Encourage healthy decisions and preventive health measures such as a healthy diet, vaccinations, regular check-ups and physical activity
- Monitor development, identify needs for additional support and provide guidance on how to further support the child's development
- Explore health-related and psychosocial developmental risks and other social determinants of health such as poverty, caregiver mental health, substance abuse or family conflicts or violence

- Provide parents with a space to raise questions and concerns about children's health and development, or their own practices as a parent
- Discuss other issues such as parenting skills, nutrition, behaviour, development and safety.

Multidisciplinary care

The primary health care provider often acts as the first point of contact in the health care system for the child or adolescent and their families. This puts the primary health care provider in a privileged position to work closely with both children and families and to provide multidisciplinary care.

Multidisciplinary care is a model where the primary health care provider takes on primary responsibility for the care of the child and acts as a care coordinator. In this role the provider can facilitate referrals, when necessary, to other forms of care such as medical specialists, oral health professionals, mental health professionals, nutritionists, social services, educational services and other community services, thereby working across disciplines to provide care.

Multidisciplinary care helps families to cope better with stress and difficulties, avoids confusion and ensures cost–effective use of resources. For early interventions, multidisciplinary, non-fragmented care is regarded as the gold standard.

Continuity of care and transition to adult services

Ensure continuous and lifelong care. Organize transition to adult services for adolescents when appropriate (p. 709). Other special considerations pertaining to adolescents are covered in Chapter 8.

Family-centred care

Families should be active and equal partners in the care of the child, regardless of their educational and socioeconomic background.

Adopt family-centred care approaches and attitudes in your daily practice:

- Encourage parents or caregivers to participate in the process as fully informed partners
- Attend to caregivers' concerns: they know their children best
- Ask open-ended questions to build rapport with families and allow sufficient time for caregivers to fully express their thoughts: this can yield invaluable information

- Acknowledge and praise families' efforts in supporting their child.

Embrace cultural and ethnic diversity:

- Respect all children and families, their cultural backgrounds, priorities and beliefs without discriminating in any way.

Empower families:

- Recognize that children and families are capable of confronting problems using their own strengths, resources and problem-solving skills
- Help families to find and mobilize their internal resources
- Make decisions about the child together with the family and the child
- Practise supportive listening and highlight the family's strengths: this simple strategy may itself be therapeutic and empowering.

Help the family and explore strategies to cope with risk factors:

- If the family is struggling, mention available resources in the community and link the family to these resources (e.g. family resource centres, home visiting programmes, parent education programmes, social services and support groups).

1.2 General standards and principles

Primary health care, as first described in the Declaration of Alma-Ata (1978) and re-affirmed by the Astana Declaration (2018), encompasses physical, mental and social well-being. It strives to be people-centered and to meet the whole spectrum of health needs – from disease prevention and health promotion, to treatment, rehabilitation and palliative care, from birth to the end of life. This underlines the responsibility of governments to make quality essential health services available and accessible.

1.2.1 WHO quality of care standards for children and adolescents

WHO has developed standards for the quality of care provided to children and adolescents, which should be applied in all primary care settings.

- **Standard 1.** Every child receives evidence-based care and management of illness according to international (e.g. WHO) guidelines.
- **Standard 2.** The health information system ensures the collection, analysis and use of data to ensure early, appropriate action to improve the care of every child.
- **Standard 3.** Every child with condition(s) that cannot be managed effectively with the available resources receives appropriate, timely referral, with seamless continuity of care.

- **Standard 4.** Communication with children and their families is effective, with meaningful participation, and responds to their needs and preferences.
- **Standard 5.** Every child's rights are respected, protected and fulfilled at all times during care, without discrimination.
- **Standard 6.** All children and their families are provided with educational, emotional and psychosocial support that is sensitive to their needs and strengthens their capabilities.
- **Standard 7.** For every child, competent, motivated, empathic staff are consistently available to provide routine care and management of common childhood illnesses.
- **Standard 8.** The health facility has an appropriate, child-friendly physical environment, with adequate water, sanitation, waste management, energy supply, medicines, medical supplies and equipment for routine care and management of common childhood illnesses.

1.2.2 Convention on the Rights of the Child

The Convention on the Rights of the Child (CRC) was adopted in 1989 by the UN General Assembly and has been ratified by every country in the European region. This means that the principles enshrined in the CRC are part of these countries' domestic legislation.

All professionals who work directly with or for children have a duty to respect, protect and fulfil those rights, and uphold the following key principles:

- **Article 2:** the obligation to respect and ensure children's rights for each child without discrimination of any kind
- **Article 3:** the obligation to determine, assess and take into account the best interests of children in all actions concerning them
- **Article 6:** the child's inherent right to life and the obligation to ensure to the utmost the child's survival and development
- **Article 12:** the obligation to assure children who are able to form their own opinions the right to express these opinions in all matters affecting them, and to give due weight to these opinions in accordance with the child's age and maturity
- **Article 13:** the obligation to uphold the child's right to freedom of expression, including the right to seek, receive and impart information and ideas of all kinds.

Be aware of children's rights and apply them in your practice:

- Consider the principle of the child's best interest in all health care issues
- Take into account the child's right to take part in decisions regarding treatment and care (e.g. information-sharing, assent and informed consent)
- Provide confidential counselling and advice to children of different age groups
- Communicate effectively with children and adolescents according to their developing capacities
- Provide adolescent-friendly health care
- Recognize the signs of child maltreatment in order to identify children who have been abused or neglected. Provide support and be aware of local reporting and referral mechanisms (p. 637).

1.3 Delivering effective care to children and adolescents in vulnerable situations

Many children and adolescents live in a challenging environment that makes them particularly vulnerable, both in terms of their physical and mental health and access to adequate health care. This may be the case for migrants, refugees, orphans or children who live in a disrupted family, or whose parents or carers suffer from serious mental health problems (e.g. addiction).

1.3.1 Children and adolescents in vulnerable situations

In some instances, children and adolescents face situations that generate special health care needs and limit their ability to receive adequate health care, e.g. those living in deprived areas, placed in shelters or detention facilities, without health insurance coverage or living on the streets.

Some of the children and adolescents have specific needs that should be addressed, such as:

- Symptoms due to lack of hygiene: e.g. lice, serious dental problems
- Infectious diseases, including sexually transmitted infections (STIs) (p. 688)
- Victimization and violence, including sexual abuse and (enforced) prostitution (p. 637)
- Substance use/abuse (p. 649)

- Mental health problems including depression (p. 526), anxiety (p. 534) and suicidal behaviour (p. 530)
- Lack of enrolment in the school and educational system.

Many of these problems need a multidisciplinary, systems-based approach, and the primary health care provider should:

- Work closely with social services or street social workers acting as go-betweens (lowering the threshold for accessing health care) in order to improve access to health care
- Provide regular screening, e.g. testing for STIs and HIV (p. 690)
- Provide counselling messages, e.g. on safer sex (p. 678)
- Liaise with the school system, promote the reintegration of dropout youngsters
- Identify financial resources to cover health care expenditure
- Refer to psychologists or psychiatrists when appropriate
- Foster peer support and education.

1.3.2 Migrant and refugee children and adolescents

Children and adolescents undergoing asylum-seeking procedures often arrive in their host country after a long journey, sometimes unaccompanied after separation from parents and family, and may have endured severe physical and/or mental suffering as well as violence.

It is the responsibility of the host countries' health care system to offer migrants and refugees children access to health care, as enshrined in the Convention of the Rights of the Child (CRC).

Migrant and refugee children and adolescents deserve information about and access to preventive measures and/or may suffer from various diseases or conditions that need to be identified, such as:

- Incomplete vaccination status (p. 69)
- Infectious diseases, e.g. tuberculosis (p. 631), hepatitis B and C (p. 415), malaria, intestinal parasites or STIs (p. 688)
- Nutritional deficiencies
- Mental trauma, from the journey as well as from the prior circumstances

- Being subject or witness to extreme violence, including sexual, physical or psychological violence, abuse or trafficking, and therefore at risk of post-traumatic stress syndrome (PTSD) and other medical, psychological and psychosocial sequelae
- A lack of short- and long-term perspectives and often a fear of being rejected and sent back to their country of origin.

Some factors to consider that will make your role as a primary health care provider easier and more effective:

- Be aware of specific diseases that migrants may have contracted in their country of origin (e.g. malaria, tuberculosis, worms) and how to address them
- Understand the reasons for migration
- Appreciate the differences between the values and habits of the country of origin and the host country
- Work together with translators
- Network with local social services, including child protection authorities, as well as with school teaching staff and health services.

Your role can entail the following tasks:

- Counsel on preventive measures to promote hygiene (e.g. access to sanitation, safe drinking water, dental care) and vaccinations
- Identify and treat communicable diseases
- Identify, refer and report cases of child maltreatment (p. 637), including sexual violence
- Recognize mental health conditions such as anxiety, depression and PTSD and address them appropriately, e.g. by referring to psychosocial services.

Many unaccompanied young people lack documents to prove their age. Since children have additional rights over adults, you may be asked to perform an age assessment. Current evidence indicates that medical methods cannot determine the age of those in their upper teens with the precision needed for this critical assessment. A holistic assessment that allows for a fair benefit of the doubt is therefore highly preferable. Always bear in mind that the best interests and rights of the child are primary considerations in all actions concerning children.

Notes

CHAPTER 2

Diagnostic approaches to the child and adolescent

2.1 Well-child visits, problem visits, follow-up visits

A distinction can be made between different types of visits, each of which requires its own management approach. The approach may differ depending on whether you know the child or not.

Well-child visits are usually appointments that occur on a regular basis to monitor the child's growth and development (see Chapter 3).

Stages of management during a well-child visit:

- Taking history
- Examination
- Counselling

If there is a complaint or finding, see stages of management during a problem visit below.

Problem visits are focused on new or existing health issues, concerns, worries or symptoms, as well as on monitoring chronic conditions.

Stages of management during a problem visit:

- Emergency triage and treatment (if required)
- Taking a history
- Examination

- Laboratory investigations (if required)
- Making a diagnosis or a differential diagnosis
- Treatment
- Referral to the hospital or specialist (if required)
- Follow-up (if required).

Follow-up visits

The timing and purpose of follow-up visits vary, depending on several factors: the initial presenting complaint or condition, whether the condition is acute or chronic, whether any medication (e.g. antibiotic) has been prescribed, and whether the visit was planned or signs have appeared that suggest a worsening condition (see Follow-up care p. 17 for more information).

Every visit is an opportunity to counsel the child and caregivers about disease prevention and health promotion (e.g. physical activity, nutrition, vaccinations, dental status, body mass index (BMI) measurement).

2.2 Taking a paediatric history

Taking a history and talking to the child help to establish a rapport with child and parent, and is an essential step before starting the examination.

- Ask open-ended questions. Give the child enough time to answer without interruptions.
- Depending on the child's age or suspected condition, you may ask to talk to the child without the presence of the parents, if this is in the child's best interest.
- Obtain the history from the parent or caregiver for younger children. Older children should take part in the information-sharing process if they have the capacity to understand.
- If the child speaks another language and a translator is needed, communicate with the child by means of supportive non-verbal language and signs.

DO NOT use medical jargon.

DO NOT speak to children in a language they cannot understand.

For additional considerations when taking a history and talking to an adolescent see p. 668.

Table 1. Taking a history

Presenting complaint
Taking a history generally starts with understanding the presenting complaint: • "Why did you bring your child?" or "What brings you here today?" if the child is older/unaccompanied • When and how did it start? If several symptoms, in which order did they start? Any previous episodes? • Siblings or other household members with similar symptoms • In infants and younger children: — Feeding (any changes to pattern, volume) — Bowel movements, wet nappies — Sleeping pattern, alertness, activity — Weight gain or loss
Past medical history
• Previous illnesses, injuries, hospital admissions • Check completeness of vaccination status
Drug history
• Any current medications. • Known drug allergies
Birth and pregnancy history
• Maternal age and obstetric history: complications during pregnancy, nutritional status, folic acid/vitamin D supplements, number of pregnancies • Problems during delivery: fetal distress, forceps or breech delivery, caesarean birth injuries, admission to neonatal care unit • Gestational age, birth weight, Apgar score • Problems during the neonatal period: jaundice, infection, feeding problems
Developmental history
• Age when key milestones were achieved (see Chapter 3) and current developmental abilities • School-age child: any specific problems (academically, physically, socially with peers)
Behavioural history
• Behavioural concerns for age: aggressive, isolation, self-harm, addictions

Family history
• Diseases in family such as epilepsy, diabetes, hypertension, asthma, tuberculosis, sickle cell disease, severe anaemia, thalassaemia
Social history
• Living situation and conditions • Primary caregiver, number of siblings • School attendance

2.3 Approach to the child and physical examination

General considerations during clinical examination of a child

Create a comfortable environment

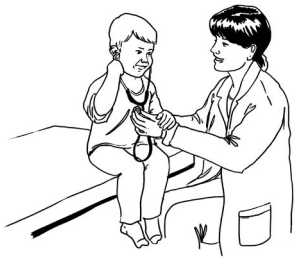
- Perform the examination in a private and child-friendly environment (see Annex 1) with a comfortable and appropriate room temperature.
- Avoid fully undressing the child unnecessarily; undress the part to be examined (i.e. first upper, then lower body) to avoid hypothermia.

Build a trusting relationship

- Keep a comfortable distance, make eye contact, stay at the child's level as much as possible. Avoid towering over them.
- Engage as much as possible with the child and establish rapport.
- Inform the child what is being examined and how. Let the child know you will not be doing anything without explaining it first.
- Ask the child for consent to be touched (depending on the age) and never touch the child without warning.
- Be honest if something is going to hurt.

Use distraction as a tool to break the ice

- Break the ice with some small talk before or during the exam, e.g. about movies or trends that appeal to children of different ages.



Playful examination: allow the child to examine your instruments.

- Make the examination as playful as possible: keep a toy or stickers on hand; tell a story throughout the examination; allow the child to examine and play with your instruments such as stethoscope or reflex hammer.

Include the parents or caregivers during the examination

- Allow parents or caregivers to accompany the child at all times during examinations (exception: suspected child abuse or neglect, see p. 637).
- Examine young children as much as possible in the parent or caregiver's arms or lap.
- If the child is distressed or crying, leave the child to settle for a brief time with the caregiver.

Examine young children in the caregiver's arms.

Observation and sequence of physical examination

Observation is an important diagnostic tool. It starts the very first moment you see the child, e.g. while playing in the waiting room, on initial greeting and when taking the history.

Hand hygiene

- Wash and disinfect your hands before the examination (see "5 moments of hand hygiene", p. 776)

Organize the examination in a flexible way that does not upset the child

Start with observation of the child (and how the child interacts with parents or caregivers). Observe as many signs as possible before touching the child: these and other signs should be recorded before the child is disturbed.

- General appearance:
  - — Well/unwell, active/lethargic, discomfort, irritable, distressed, malnourished

  - Does the child speak, cry or make any sound?
  - Is the child alert, interested and looking around?
  - Drowsy appearance, vomiting, able to suck or breastfeed?
- Any signs of respiratory distress
- Use of auxiliary muscles of breathing
- Lower chest wall indrawing
- Fast breathing
- Sitting upright with the support of extended arms.
- Other signs:
  - Jaundice, pallor, cyanosis, clubbing, oedema, lymphadenopathy, rashes, petechiae.

▶ Then proceed to record signs that require touching the child but are minimally disturbing, such as taking the pulse or listening to the heart and lung. If the child is calm and not distressed, take the opportunity to examine the cardiac, respiratory and neurological systems first.

▶ Perform the most unsettling part of the examination last: recording temperature, testing for skin turgor (pinch test for dehydration), measuring blood pressure or examining ears, nose, throat and mouth.

General physical examination

See Table 2 on how to perform a thorough physical examination. A flexible approach is necessary and the sequence of the examination can be adapted depending on the presenting complaint, age and whether you know the child. The most unsettling parts of the examination should be performed last. Every child should nevertheless receive a complete systematic examination at regular intervals/on well-child visits. See Examination of newborns p. 116, and of adolescents p. 672.

Table 2. Components of a comprehensive physical examination (sequence to be adapted)

Skin
• Inspect skin: pallor, jaundice, rashes, signs of injuries e.g. bruises?
Head and neck
• Palpate fontanelle in children < 24 months: bulging or sunken? • Palpate head and neck including thyroid: cysts, enlarged lymph nodes, neck stiffness? • Examine eyes: abnormalities, signs of infection, nystagmus, pupils equal and reactive to light and accommodation (PERLA)? • Perform red eye reflex examination: present and equal on both sides? • Inspect nose: foreign bodies, visible polyps, septum deviation? • Check mouth and throat: cleft palate, number and hygiene of teeth, enlarged or red tonsils, tonsillar exudate? • Inspect ears for abnormalities and check tympanic membranes with an otoscope: redness, bulging, perforation?
Respiration
• Count the respiratory rate: tachypnoea? • Inspect for cyanosis and signs of respiratory distress: tracheal traction, use of accessory muscles, chest indrawing, nasal flaring, retractions? • Percuss and auscultate lungs: dullness, abnormal breath sounds, e.g. crackles or rhonchi, stridor, wheeze? • Measure oxygen saturation with pulse oximeter if signs of respiratory distress.
Cardiovascular
• Auscultate heart sounds and rhythm: tachycardia, arrhythmia, murmurs? • Palpate location of heart apex: displaced? • Palpate pulses (brachial in infants and femoral or radial in older children)
Abdomen
• Inspect: abdominal distension, visible masses, peristalsis, hernias? • Auscultate: overactive or decreased/absent bowel sounds? • Palpate first gently then deeper: tenderness, rebound, guarding, ascites, masses, enlarged liver or spleen? • Palpate and percuss kidneys in the flanks: renal mass, enlarged, tenderness?

External genitalia

- Inspect boys' genitalia: hernias, hydroceles, testes absent from scrotum?
- Inspect girls' genitalia: vaginal discharge, hypertrophy of clitoris?

DO NOT *routinely use speculums or anoscopes or perform digital or bimanual examinations of the vagina or rectum. If medically needed, refer the child since sedation or general anaesthesia may be necessary.*

Musculoskeletal

- Inspect back: kyphosis, lordosis or scoliosis?
- Inspect extremities and joints: muscle atrophy, range of motion, stability, swelling, tenderness?

Neurological

- Check muscle tone by passively moving upper and lower limbs through a range of motion: signs of hypertonia or hypotonia?
- Test reflexes e.g. patellar reflex.
- Observe the child's gait (if able): abnormal or asymmetric movements?

Development

- Assess developmental milestones (Chapter 3).

Vital signs

- Measure axillary temperature, heart rate, respiratory rate, blood pressure (p. 789), capillary refill time (p. 714). See p. 713 for normal ranges of vital signs.

Growth

- Measure weight, height/length, head circumference (children ≤ 5 years) and calculate weight-for-height/length, weight-for-age, height/length-for-age, body mass index (BMI). See Growth monitoring, p. 20.

2.4 Differential diagnoses

After the assessment has been completed, consider the various conditions that could cause the child's illness and make a list of likely differential diagnoses. This helps to avoid making wrong assumptions and missing rare problems.

Laboratory and radiological investigations based on the history and examination can help narrow the differential diagnosis. In order to avoid unnecessary referral these investigations should be available at the primary health care level.

- "When you hear hoofbeats, think horses, not zebras."
  When searching for a diagnosis, the obvious and most common possibilities should be considered first before more unlikely options.
- A sick child may have more than one clinical problem requiring treatment.

After the main diagnosis and any secondary diagnoses or problems have been determined, plan and start a course of treatment. Once again, if several diagnoses or problems are present, several treatments may need to be given at the same time. Review the list of differential diagnoses after observing the response to treatment or in the light of new clinical findings. At this stage the diagnosis may need to be revised or additional diagnoses taken into consideration.

2.5 Follow-up care

Depending on the presenting complaint and treatment or findings during the well-child visit, it may be necessary to provide follow-up care. Follow-up visits can be scheduled a few days (usually 3–5 days) after initial presentation, depending on the condition. Guidance on the follow-up of specific clinical conditions is given in the appropriate sections of this book.

Scheduled follow-up

- Advise the parents or caregivers when to return:
  - for a fixed follow-up visit in a specific number of days (when required)
  - to check progress or response to a treatment
  - for the child's next immunization.

When to return immediately

- Tell the parents or caregivers to return immediately for reassessment if the child develops any of the following danger signs:
  - not able to drink or breastfeed
  - becomes sicker
  - persisting fever for 2–3 days
  - signs of illness return again after successful treatment
  - in a child with a cough or cold: fast or difficult breathing
  - in a child with diarrhoea: blood in stool or drinking poorly.

CHAPTER 3

Well-child visits

Well-child visits are regular appointments to monitor a child's growth and development from birth until the age of 18 years. Well-child visits include a variety of measures. The components and frequency of well-child visits are determined by national guidelines. While regular visits throughout the child's early development are beneficial, school-age children can be seen at longer time intervals and do not require yearly visits.

Well-child visits offer many opportunities for prevention, including:

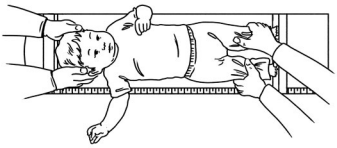
- Motivating for and providing vaccinations
- Detecting disease and development difficulties at an early stage
- Counselling on how to foster healthy development of the child, prevent injuries, healthy diet and physical activity

- Identifying problems at an early stage
- Assessing the child's environment
- Preventing and recognizing child abuse promptly
- Answering questions posed by parents or caregivers
- Building a trustworthy relationship with the child and parent or caregiver
- Coordinating support with community health services such as breast-feeding counselling and school health.

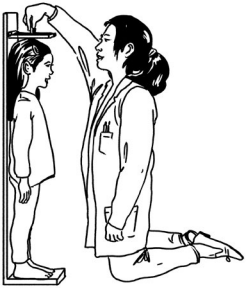
3.1 Growth monitoring

Measuring the child's growth is an essential part of every well-child visit:

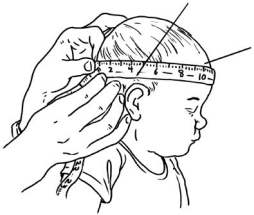
- Regularly assess the following parameters to classify the nutritional status: measure the weight, length (from birth to 2 years), height (from 2 years) and head circumference of children with age-appropriate and well-adjusted scales and stadiometers.
- Calculate weight-for-age, length-for-age or height-for-age; weight-for-length or weight-for-height and body mass index (BMI = kg/m^2: weight in kilograms/height in metres squared).
- Plot the measurements (with the date) and any available previous measurements on the same growth chart for the same child so that any abnormal growth becomes visible over time.
- Apply gestational correction for infants born before 37 completed weeks' gestation: corrected age (number of weeks early) = 40 weeks minus gestational age at birth in weeks. Adjust the plot for the number of weeks a baby was born early: plot the actual (calendar) age of the child and draw a line back to the corrected age and mark this with an arrow. The point of the arrow shows the z-score with adjustment for preterm birth. You may need to use a more detailed growth chart, e.g. 0 to 6 months of age. Continue gestational correction until 1 year for infants born at 32–36 weeks and 2 years for infants born before 32 weeks.
- Compare the points plotted on the child's growth charts with the z-score lines to determine whether they indicate a growth problem.
- Compare the values of the nutritional parameters with WHO Child Growth Standards. They are available as sex-specific growth charts (Annex 3) or as tables online.
- Provide a copy of the records for the family, so that it can be used if the child visits another physician.



Length measurement from birth to 2 years of age



Height measurement in children from 2 years of age



Head circumference measurement
Measure the head circumference with a non-stretchable tape. Take three measurements until you get a consistent value. Use the same chart for the same child over time.

Children < 5 years of age

The assessment of weight-for-height/length can identify acute malnutrition (wasting), overweight and obesity. The evaluation of height/length-for-age can identify stunting (Table 3).

Growth faltering should also be identified along with the conditions listed in Table 3. It is characterized by a slower rate of weight or height gain in childhood than expected for age and sex. The child's growth when plotted on the growth chart will fall below the expected trajectory of the growth line over time. See Annex 3.

Table 3. Classification of nutritional status in children < 5 years

Comparison with WHO Child Growth Standards[1]	Weight-for-height/ length	Height/length-for-age
> + 3SD	Obesity	—
> + 2SD	Overweight	—
≥ - 2SD and ≤ + 2SD	Normal	Normal
< - 2SD and ≥ - 3SD	Moderate acute malnutrition (wasting)	Moderate stunting
< - 3SD	Severe acute malnutrition (wasting)	Severe stunting

[1] Expressed as number of standard deviations (SD) below or above the reference mean value (called "z-score"). Z-scores measure how far an individual's nutritional parameter is from the mean of a population. Note that in many settings percentiles are used for growth monitoring. Percentiles use the median as the average (50th percentile), while z-scores use the mean as average (z-score of 0).

Children ≥ 5 years of age

In children ≥ 5 years overweight and obesity are defined based on BMI-for-age. See Table 4.

Table 4. Classification of nutritional status in children ≥ 5 years

Comparison with WHO Child Growth Standards	BMI-for-age in children
> + 2SD	Obesity
> + 1SD	Overweight
≥ - 2SD and ≤ + 1SD	Normal
< - 2SD and ≥ - 3SD	Thinness
< - 3SD	Severe thinness

Adolescents

- Assess the nutritional status as described above.
- Assess pubertal development (p. 673).

Management of nutritional problems

- Provide nutritional counselling (p. 81) if growth and other indicators are abnormal or when the caregiver has concerns.
- See p. 511 for management of weight and growth problems.

3.2 Well-child visit: birth – 72 hours

Most children will be seen in hospital for these visits; if not, they ought to be seen by the primary care provider within 24 hours of birth and again at 48–72 hours.

- Look for congenital diseases and jaundice
- Support caregivers.

History

- Problems during pregnancy, e.g. diabetes, medications, substance abuse, acute or chronic infections, mental or social stress, abnormal test results, e.g. positive group B Streptococcus, HIV, hepatitis B
- Mode of delivery and problems during or after birth
- Congenital disorders in the family, e.g. hip problems
- Hip dysplasia risk factors, e.g. twin pregnancy, breech position
- Problems passing meconium and urine
- Apgar score at 5 and 10 min of life (Table 5).

Table 5. Apgar score

Apgar Sign	2	1	0
Appearance (skin colour)	Normal colour all over (hands and feet are pink)	Normal colour (but hands and feet are bluish)	Bluish-gray or pale all over
Pulse (heart rate)	Normal (above 100 beats per minute)	Below 100 beats per minute	Absent (no pulse)
Grimace	Pulls away, sneezes, coughs, or cries	Facial movement only with stimulation	Absent (no response to stimulation)
Activity (muscle tone)	Active, spontaneous movement	Arms and legs flexed with little movement	No movement, “floppy” tone
Respiration (breathing rate and effort)	Normal rate and effort, good cry	Slow or irregular breathing, weak cry	Absent (no breathing)

Examination

- Perform a complete physical examination (p. 116):
  - **Anthropometric measurements:** measure and plot the weight, length and head circumference.
  - **Skin:** pallor, cyanosis, jaundice (p. 148), wounds, birthmarks, rash (p. 143) or bruises
  - **Head and neck:** bulging fontanelle (p. 128), crepitations, cleft palate (p. 129), caput succedaneum (p. 126), ptosis (p. 134), absent red eye reflex (p. 133), coloboma (p. 133), nystagmus, ear deformities (p. 131)
  - **Respiration:** retractions, tachypnoea, abnormal respiratory sounds
  - **Cardiovascular:** tachycardia, arrhythmia, heart murmur (p. 325), no femoral pulse or difficult to palpate
  - **Abdomen, genitalia and anus:** hernias, masses, enlarged liver or spleen, abnormal genitalia (p. 136), undescended testicles (p. 137), imperforate or displaced anus (p. 137)
  - **Musculoskeletal:** asymmetrical movements and posture, fractures, injuries, extra digits, talipes, spine intact, asymmetry of the limbs and skin folds (perform Barlow and Ortolani manoeuvres before age 1 month, see p. 142)
  - **Neurological:** abnormal muscle tone, newborn reflexes present (p. 118)
  - **Phenotypical alterations:** if more than 2 alterations (Table 6) refer to specialist for neurological/psychomotor assessment.

Table 6. Phenotypical alterations

Head	Hands
• Up- or downward slanting eyes • Exceptionally wide- or narrow-set eyes • Cleft lip or palate (p. 129) • Low-set ears • Exceptionally short neck • Skin fold running along the side of the neck (webbed neck)	• Single crease across the centre of the palm • Crooked little finger (a very short fifth digit where the bone is curved or bent)

Investigations and screenings (if not already done)

- Blood test for congenital metabolic and endocrine disorders + cystic fibrosis (age > 36 hours to 7 days depending on national screening programme):
  - — if positive: follow the laboratory's recommendations.
- Screening for hearing loss (auditory brainstem responses and/or otoacoustic emissions): age > 24 hours to max. 1 month:
  - — if positive: refer to audiologist at no later than age 3 months.
- Pulse oximetry screening for congenital heart defects (p. 159):
  - — positive screening (any of the following): oxygen saturation (SpO_2) < 90% in either extremity or SpO_2 < 95% in right hand and foot on 3 measures, each separated by 1 h or > 3% difference between right hand and foot on 3 measures, each separated by 1 h.
  - — if positive: give oxygen when $SpO_2 \leq 90\%$, treat other causes of hypoxaemia (e.g. sepsis), refer urgently to hospital.
- Assess for hyperbilirubinaemia (p. 148) with serum bilirubin or transcutaneous bilirubinometer if jaundiced, especially in the first 72 hours of life.
  - — if positive = bilirubin above thresholds for referral (Table 7): treat if suspected infection, refer urgently (< 6 hours) to hospital for phototherapy
  - — if bilirubin below but within 50 µmol/L of threshold (2.9 mg/dL): repeat measurement (< 24 hours).

Counselling

- ▶ Counsel on:
  - — Warmth: encourage kangaroo mother care (p. 123) and skin-to-skin contact
  - — Sudden infant death syndrome (SIDS) prevention (p. 123)
  - — Feeding (p. 83) and vitamin K (p. 97)
    - Encourage exclusive breastfeeding for 6 months (p. 83) and increase breastfeeding during illness
    - Formula if breastfeeding is not possible/suitable (p. 92)
    - Vitamin K 1 mg IM after birth to prevent bleeding (or 3 x 2 mg orally at birth, at 4 to 6 days and at 4 to 6 weeks).

Table 7. Bilirubin thresholds for management of neonatal jaundice

Age	35 to < 38 weeks with risk factors*	35 to < 38 weeks without risk factors; ≥ 38 weeks with risk factors*	≥ 38 weeks without risk factors
24 h	8 mg/dL (140 µmol/L)	10 mg/dL (170 µmol/L)	12 mg/dL (200 µmol/L)
48 h	11 mg/dL (190 µmol/L)	13 mg/dL (220 µmol/L)	15 mg/dL (260 µmol/L)
72 h	13.5 mg/dL (230 µmol/L)	15 mg/dL (260 µmol/L)	18 mg/dL (310 µmol/L)
96 h	14.5 mg/dL (250 µmol/L)	17 mg/dL (290 µmol/L)	20 mg/dL (340 µmol/L)
≥ 120 h	15 mg/dL (260 µmol/L)	18 mg/dL (310 µmol/L)	21 mg/dL (360 µmol/L)

* risk factors: haemolytic disease e.g. ABO-incompatibility and G6PD deficiency, sepsis/serious bacterial infection, excessive weight loss, hypothyroidism, preterm birth.

- Complete immunization status (p. 68)
  - — Routine immunizations may include hepatitis B and BCG. Refer to the national immunization scheme.
  - — Arrange appointment for upcoming immunization.
- Schedule next well-child visit appointment

3.3 Well-child visit: 1 week

- Look for congenital diseases and jaundice
- Follow up weight gain and vaccinations
- Support caregivers and counsel on feeding, activity and safety

History

- Care situation and exceptional burdens in the family
- Feeding difficulties
- Abnormal crying
- Congenital disorders in the family, e.g. hip problems, eye conditions

Examination

- Perform a complete physical examination (p. 116). Look for signs of acute illness or congenital conditions:
  - **Growth:** measure body weight, length and head circumference (p. 21) and confirm the z-score according to the WHO growth charts (Annex 3). Newborn typically lose up to 10% of their birth weight during the first days of life and regain it within 10–14 days. If weight loss exceeds 10% of birth weight, see p. 119.
  - **Skin:** pallor, cyanosis, jaundice (p. 148), rashes (p. 143), hydration
  - **Head and neck:** bulging fontanelle (p. 128), crepitations, cleft palate (p. 129), caput succedaneum (p. 126), ptosis (p. 134), absent red eye reflex (p. 133), coloboma (p. 133), nystagmus, ear deformities (p. 131)
  - **Respiration:** tachypnoea, retractions, abnormal breath sounds
  - **Cardiovascular:** tachycardia, arrhythmia, heart murmur (p. 325), no femoral pulse or difficult to palpate
  - **Abdomen, genitalia:** abnormal umbilicus/genitals, masses, hernias, undescended testicles (p. 137)
  - **Musculoskeletal:** spine intact, fractures, asymmetry of the limbs and skin folds (perform Barlow and Ortolani manoeuvres before age 1 month, p. 142)
  - **Neurological:** newborn reflexes present (p. 118), abnormal tone, opisthotonus
  - **Phenotypical alterations:** if more than 2 alterations (Table 6, p. 25) refer to specialist for neurological/psychomotor assessment

— **Other:** parent–newborn interaction adequate.

Investigations (if not already done after birth: see well-child visit birth–72 hours, p. 26)

- Blood test for congenital metabolic and endocrine disorders + cystic fibrosis (p. 26)
- Hearing screening (p. 119)
- Screening for heart defects using pulse oximetry (p. 26)

Counselling

- Counsel on:
  - — Feeding (p. 83) and vitamin supplements (p. 97)
    - Encourage exclusive breastfeeding for 6 months, increase breastfeeding during illness (p. 83)
    - Formula feeding if breastfeeding is not possible (p. 92)
    - Vitamin K: give second dose of 2 mg orally at 4–6 days, if not already given IM right after birth
    - Vitamin D 400 IU orally per day for at least 12 months to prevent rickets
  - — Oral hygiene and caries prevention (p. 101)
  - — Sun protection (p. 104)
  - — Injury prevention (p. 106)
  - — Sudden infant death syndrome (SIDS) prevention (p. 123)
  - — Physical activity, sedentary behaviour and sleep (p. 102–p. 104)
    - Various physical activities several times a day, with interactive floor-based play, for at least 30 min/day on the tummy
    - 14–17 hours of good quality sleep
    - Avoid restraint for > 1 hour at any one time, e.g. in pram.
- Check and complete immunization status (p. 68)
  - — Routine immunizations include hepatitis B, polio, diphtheria, tetanus, pertussis, *Haemophilus influenzae* type b, pneumococci, rotavirus. Refer to the national immunization scheme.
  - — Arrange appointment for upcoming immunization.
- Schedule next well-child visit appointment.

3.4 Well-child visit: 1 month

- Follow up growth and vaccinations
- Support caregivers and counsel on feeding, activity and safety

History

- Serious illnesses since last check-up
- Care situation and exceptional burdens in the family
- Feeding difficulties (p. 86)
- Abnormal crying
- Risk factors for developmental difficulty (p. 48)

Examination

- Perform a complete physical examination (p. 116). Look for signs of acute illness or chronic conditions:
  - **Growth:** measure body weight, length and head circumference (p. 21) and confirm the z-score according to the WHO growth charts (Annex 3). If abnormal growth, e.g. weight-for-length < -2 SDs or > +2 SDs, see p. 511–p. 523.
  - **Skin:** pallor (p. 403), cyanosis, jaundice (p. 148), rash (p. 143), signs of injuries, e.g. bruises
  - **Head and neck:** bulging fontanelle (p. 128), crepitations, cephalohaematoma (p. 127), ptosis (p. 134) absent red eye reflex (p. 133), coloboma (p. 133), nystagmus
  - **Respiration:** tachypnoea, retractions, abnormal breath sounds (wheeze, stridor)
  - **Cardiovascular:** tachycardia, arrhythmia, heart murmur (p. 325), no femoral pulse
  - **Abdomen, genitalia:** enlarged liver or spleen, masses, hernias, undescended testicles (p. 137)
  - **Musculoskeletal:** asymmetrical movement, asymmetry of the limbs and skin folds (perform Barlow and Ortolani manoeuvres before age 1 month, p. 142)
  - **Neurological:** muscle reflexes present (Moro/grasp/sucking), abnormal tone, opisthotonus

- **Development:** assess developmental milestones (Table 8). If milestones are not met or risk factors for developmental difficulties are present (p. 61), see p. 64 for management
- **Signs of child abuse or neglect:** poor hygiene, unusual presence of injuries and bruises not matching the given explanation (p. 638)

Table 8. Developmental milestones 1 month

What to expect by age 1 month
• Maintains head position for ≥ 3 sec when suspended in prone position • Opens hands spontaneously • Follows an object with eyes to ≥ 45° • Looks attentively at faces of close caregivers

Counselling

- Counsel on:
  - Feeding/nutrition (p. 81) and vitamin supplements (p. 97)
    - Encourage exclusive breastfeeding for 6 months, increase breastfeeding during illness (p. 92)
    - Formula feeding if breastfeeding is not possible/suitable (p. 92)
    - Vitamin K: give third dose of 2 mg orally at 4 to 6 weeks, if not already given IM right after birth
    - Vitamin D 400 IU orally per day for at least 12 months to prevent rickets
  - Oral hygiene and caries prevention (p. 101)
  - Sudden infant death syndrome (SIDS) prevention (p. 123)
  - Physical activity, sedentary behaviour and sleep (p. 102–p. 104)
    - Various physical activities several times a day for at least 30 min/day in prone position (on tummy).
    - 14–17 hours of good quality sleep.
    - Avoid restraint for > 1 hour at any one time, e.g. in pram
  - Supporting early childhood development (p. 60)
  - Sun protection (p. 104)
  - Injury prevention (p. 106)

- Check and complete immunization status (p. 68)
  - Routine immunizations include hepatitis B, polio, diphtheria, tetanus, pertussis, *Haemophilus influenzae* type b, pneumococci, rotavirus. Refer to the national immunization scheme.
  - Arrange appointment for upcoming immunization.
- Schedule next well-child visit appointment

3.5 Well-child visit: 3 months

- Follow up growth and vaccinations
- Support caregivers and counsel on feeding, activity and safety

History

- Serious illnesses since last check-up
- Care situation and exceptional burdens in the family
- Vomiting, feeding difficulties
- Abnormal crying (p. 152)
- Vision or hearing problems
- Risk factors for developmental problems (p. 61)

Examination

- Perform a complete physical examination (p. 15). Look for signs of acute illness or chronic conditions:
  - **Growth:** measure body weight, length and head circumference (p. 21) and confirm the z-score according to the WHO growth charts (Annex 3). If abnormal growth, e.g. weight-for-length < -2 SDs or > +2 SDs, see p. 511–p. 523.
  - **Skin:** pallor, cyanosis, jaundice (p. 148, p. 411), rash (p. 386), signs of injury, e.g. bruises
  - **Head and neck:** bulging fontanelle (p. 128), nystagmus, strabism (perform Brückner test, p. 442), abnormal eye movements (p. 439)
  - **Respiration:** tachypnoea, retractions, abnormal breath sounds
  - **Cardiovascular:** tachycardia, arrhythmia, heart murmur (p. 325)
  - **Abdomen, genitalia:** enlarged liver or spleen, masses, hernias, undescended testicles (p. 137)
  - **Musculoskeletal and neurological:** asymmetrical movement, muscle reflexes present (palmar and plantar grasp, newborn reflexes), abnormal tone, opisthotonus
  - **Development:** assess developmental milestones (Table 9). If milestones are not met or risk factors for developmental difficulties are present (p. 61), see p. 64 for management

— **Signs of child abuse or neglect:** poor hygiene, unusual presence of injuries and bruises not matching the given explanation (p. 638)

Table 9. Developmental milestones 3 months

What to expect by age 3 months
• Holds head upright for ≥ 30 sec • Supports self with forearms when in prone position • Moves hands spontaneously towards centre of body • Attempts to localize source of sound by turning head • Returns the smile of a caregiver

Counselling

- Counsel on:
  - — Feeding/nutrition (p. 81) and vitamin supplements (p. 97)
    - Vitamin D (400 IU orally per day for at least 12 months) to prevent rickets
  - — Oral hygiene and caries prevention (p. 101)
  - — Sudden infant death (SIDS) prevention (p. 123)
  - — Physical activity, sedentary behaviour and sleep (p. 102–p.104)
    - Various physical activities several times a day, with interactive floor-based play, for at least 30 min/day in prone position (on tummy)
    - 14–17 hours of good quality sleep
    - Avoid restraint for > 1 hour at any one time, e.g. in pram
  - — Supporting early childhood development (p. 60)
  - — Sun protection (p. 104)
  - — Injury prevention (p. 106).
- Check and complete immunization status (p. 68)
  - — Routine immunizations hepatitis B, polio, diphtheria, tetanus, pertussis, *Haemophilus influenzae* type b, pneumococci, rotavirus. Refer to the national immunization scheme.
  - — Arrange appointment for upcoming immunization.
- Schedule next well-child visit appointment.

3.6 Well-child visit: 6 months

- Follow up growth and vaccinations
- Support caregivers and counsel on feeding, activity and safety

History

- Serious illnesses since last check-up
- Care situation and exceptional burdens in the family
- Feeding difficulties (p. 86), abnormal stools
- Vision or hearing problems
- Abnormal crying (p. 152)
- Risk factors for developmental difficulty (p. 61)

Examination

- Perform a complete physical examination (p. 15). Look for signs of acute illness or chronic conditions:
  - **Growth:** measure body weight, length and head circumference (p. 21) and confirm the z-score according to the WHO growth charts (Annex 3). If abnormal growth, e.g. weight-for-length < -2 SDs or > +2 SDs, see p. 511–p. 523.
  - **Skin:** pallor, rash (p. 386), signs of injuries, e.g. bruises, haemangiomas (p. 147), congenital dermal melanocytosis (p. 147)
  - **Head and neck:** bulging fontanelle (p. 128), nystagmus, strabism (perform Brückner test p. 442), abnormal eye movement (p. 439)
  - **Respiration:** tachypnoea, retractions, abnormal breath sounds
  - **Cardiovascular:** tachycardia, arrhythmia, heart murmur (p. 325)
  - **Abdomen, genitalia:** enlarged liver or spleen, masses, hernias, undescended testicles (p. 137)
  - **Musculoskeletal and neurological:** asymmetrical movement, abnormal muscle tone, absent or diminished muscle reflexes
  - **Development:** assess developmental milestones (Table 10). If milestones are not met or risk factors for developmental difficulties are present (p. 61), see p. 64 for management
  - **Signs of child abuse or neglect:** poor hygiene, unusual presence of injuries and bruises not matching the given explanation, see p. 637.

Table 10. Developmental milestones 6 months

Domains	What to expect by age 6 months
Expressive language How does your child let you know when they want something? What sounds, gestures words do they use?	• Laughs aloud • Vocalizes vowels (“aa”, “uu”)
Receptive language How do they show you that they understand when you talk to them?	• Responds by making sounds when caregivers talk
Gross (large) movements Tell me about their movement, like holding and raising the head, sitting.	• Lifts head 90° (prone) • When held erect, straightens legs, pushes against object rather than bending legs • Sits with support • Actively changes positions (rolls over)
Fine movements What do they do with their hands, like holding objects?	• Reaches for objects with hands  • Brings objects to mouth • Holds, handles toys/objects
Relating to others How does your child relate to familiar people? How do they show interest in them? What do they do to engage them? How is their eye contact?	• Has prolonged, meaningful eye contact • Shows recognition and desire to engage with caregivers by reaching, smiling, inspecting faces
Play activities Tell me about your child’s play. How do they play with people, with objects or toys?	• Makes sounds in response to face-to-face play • Brings toys/objects to mouth
Self-help activities	• Not expected to attain self-help milestones at this age

Counselling

- Counsel on:
  - Feeding/nutrition (p. 81) and vitamin supplements (p. 97)
    - Encourage introduction of complementary foods (p. 89) in addition to breastfeeding
    - Formula feeding if breastfeeding is not possible/suitable (p. 92)
    - Vitamin D (400 IU orally per day for at least 12 months) to prevent rickets
  - Oral hygiene and caries prevention (p. 101)
  - Sudden infant death (SIDS) prevention (p. 123)
  - Physical activity, sedentary behaviour and sleep (p. 102–p. 104)
    - Various physical activities several times a day, with interactive floor-based play, for at least 30 min/day in prone position (on tummy) if not yet mobile.
    - 14–17 hours of good quality sleep.
    - Avoid restraint for > 1 hour at any one time, e.g. in pram.
  - Supporting early childhood development (p. 60)
  - Sun protection (p. 104)
  - Injury prevention (p. 106)
- Check and complete immunization status (p. 68)
  - Routine immunizations include hepatitis B, polio, diphtheria, tetanus, pertussis, *Haemophilus influenzae* type b, pneumococci, rotavirus. Refer to the national immunization scheme.
  - Arrange appointment for upcoming immunization.
- Schedule next well-child visit appointment

3.7 Well-child visit: 1 year

- Follow up growth and vaccinations
- Support caregivers and counsel on feeding, activity and safety

History

- Serious illnesses since last check-up
- Care situation and exceptional burdens in the family
- Eating behaviour not age-appropriate (vegan, alternative milks)
- Abnormal stools
- Vision or hearing problems
- Risk factors for developmental difficulty (p. 61).

Examination

- Perform a complete physical examination (p. 15). Look for signs of acute illness or chronic conditions:
  - **Growth:** measure body weight, length and head circumference (p. 21) and confirm the z-score according to the WHO growth charts (Annex 3). If abnormal growth, e.g. weight-for-height < -2 SDs or > +2 SDs, see p. 511–p. 523
  - **Skin:** pallor (p. 403), rash (p. 386), signs of injuries, e.g. bruises
  - **Head and neck:** bulging fontanelle (p. 128), nystagmus, strabism (perform Brückner test, p. 442), abnormal eye movement (p. 439), pupils of different size or non-reactive, teeth abnormalities
  - **Respiration:** tachypnoea, retractions, abnormal breath sounds
  - **Cardiovascular:** tachycardia, arrhythmia, heart murmur (p. 325)
  - **Abdomen, genitalia:** enlarged liver or spleen, masses, hernias, undescended testicles (p. 137)
  - **Musculoskeletal and neurological:** asymmetrical movement, abnormal muscle tone, absent or diminished muscle reflexes
  - **Development:** assess developmental milestones (Table 11). If milestones are not met or risk factors for developmental difficulties are present (p. 61), see p. 64 for management
  - **Signs of child abuse or neglect:** poor hygiene, unusual presence of injuries and bruises not matching the given explanation (p. 638)

Table 11. Developmental milestones 14 months

Domains	What to expect by age 14 months
Expressive language How does your child let you know when they want something? What sounds, gestures and words do they use?	• Babbles by repeating many syllables Says one meaningful word • Uses arm or hand to point to people or objects
Receptive language How does your child show you that they understand when you talk to them?	Understands: • action words (“come”, “take”, “stop”) • names of objects (“ball”, “toy”) • names of familiar people (“mummy”, “daddy”)
Gross (large) movements Tell me about your child’s movements, like holding and raising the head, sitting, walking.	• Sits steady without support (by 10 months) • Pulls to stand holding onto objects • Stands alone momentarily • Walks holding onto objects 
Fine movements What does your child do with their hands, like holding objects?	• Picks up small objects using thumb and index finger
Relating to others How does your child relate to familiar people? How do they show interest in them? What do they do to engage them? How is their eye contact?	• Spontaneously seeks to share enjoyment and interest with others (cuddles caregiver, kisses, inspects toy together) • Shows recognition of stranger (turns away, stares)

Domains	What to expect by age 14 months
Play activities Tell me about your child's play. How do they play with people, with objects or toys?	• Curiously inspects toys/objects (how wheels turn, doll moves, bells ring, lights turn on) • Makes gestures on request • Imitates game "peek-a-boo" and gestures during play (clapping hands, making faces)
Self-help activities What does your child do on its own, like feeding?	• Uses fingers for feeding (knows it is food and eats it)

Counselling

- Counsel on:
  - — Nutrition (p. 81) and vitamin supplements (p. 97)
    - Consider maintaining vitamin D supplementation beyond 12 months of age if risk factors for rickets are present (p. 425)
  - — Oral hygiene and caries prevention (p. 101)
  - — Physical activity, sedentary behaviour and sleep (p. 102–p. 104)
    - Various physical activities for at least 180 minutes throughout the day at any intensity, including moderate-to-vigorous physical activity
    - No screen time for 1-year-olds. When sedentary, engage the child in reading and storytelling. Avoid restraint for > 1 hour at any one time (e.g. in pram, on caregiver's back).
    - 11–14 hours of good quality sleep
  - — Supporting early childhood development (p. 60)
  - — Sun protection (p. 104)
  - — Injury prevention (p. 106)
- Check and complete immunization status (p. 68)
  - — Routine immunizations include measles, mumps, rubella, varicella, meningococci, pneumococci, diphtheria, tetanus, pertussis. Refer to the national immunization scheme.
  - — Arrange appointment for upcoming immunization.
- Schedule next well-child visit appointment

3.8 Well-child visit: 2 years

- Follow up growth and vaccinations
- Support caregivers and counsel on feeding, activity and safety

History

- Serious illnesses since last check-up
- Care situation and exceptional burdens in the family
- Eating behaviour not age-appropriate
- Abnormal stools
- Vision or hearing problems
- Regular snoring (p. 551)
- Speech development satisfying (Table 12)
- Risk factors for developmental difficulty (p. 61)

Examination

- Perform a complete physical examination (p. 15). Look for signs of acute illness or chronic conditions:
  - **Growth:** measure body weight, height and head circumference (p. 21) and confirm the z-score according to WHO growth charts (Annex 3). If abnormal growth, e.g. weight-for-height < -2 SDs or > +2 SDs, see p. 511–p. 523.
  - **Skin:** pallor (p. 403), rash (p. 386), signs of injuries, e.g. bruises
  - **Head and neck:** nystagmus, strabism (perform Brückner test p. 442), pupils of different size or non-reactive, teeth abnormalities
  - **Respiration:** abnormal breath sounds
  - **Cardiovascular:** tachycardia, arrhythmia, heart murmur (p. 325)
  - **Abdomen, genitalia:** enlarged liver or spleen, masses, hernias, undescended testicles (p. 137)
  - **Musculoskeletal and neurological:** asymmetrical movement, abnormal muscle tone, absent or diminished muscle reflexes
  - **Development:** assess developmental milestones (Table 12). If milestones are not met or risk factors for developmental difficulties are present, see p. 64 for management

Table 12. Developmental milestones 24 months

Domains	What to expect by age 24 months
Expressive language How does your child let you know when they want something? What sounds, gestures words do they use?	• Uses at least 2 meaningful words • Uses index finger to point • Caregivers understand some of child's communication
Receptive language How does your child show you that they understand when you talk to them?	• Waves bye or uses other common gesture in response to command • Understands one simple command ("bring shoes")
Gross (large) movements Tell me about your child's movements, like holding and raising the head, sitting, walking.	• Walks alone
Fine movements What does your child do with their hands, like holding objects?	• Holds pencil or stick (in any way) and scribbles on paper or on ground/floor 
Relating to others How does your child relate to familiar people? How do they show interest in them? What do they do to engage them? How is their eye contact?	• Initiates specific interactions with people • Imitates other people's behaviour (waves back, scribbles, washes hands, stacks clothes in imitation)
Play activities Tell me about your child's play. How do they play with people, with objects or toys?	• Inspects how toys/objects work (how doll moves, bells ring) • Has simple imaginary play like feeding doll, driving cars, riding animals
Self-help activities What does your child do on its own, like feeding?	• Uses fingers for feeding (knows it is food and eats it) • May use one feeding utensil

- **Signs of child abuse or neglect:** poor hygiene, unusual presence of injuries and bruises not matching the given explanation (p. 638).

Counselling

- Counsel on:
  - Nutrition (p. 81)
  - Oral hygiene and caries prevention (p. 101)
  - Physical activity, sedentary behaviour and sleep (p. 102–p. 104)
    - Various physical activities for at least 180 minutes throughout the day at any intensity, including moderate-to-vigorous physical activity
    - Screen time no more than 1 hour. When sedentary, engage the child in reading and storytelling. Avoid restraint for > 1 hour at any one time (e.g. in pram, on caregiver's back).
    - 11–14 hours of good quality sleep
  - Supporting early childhood development (p. 60)
  - Sun protection (p. 104)
  - Injury prevention (p. 106)
- Check and complete immunization status (p. 68)
  - Routine immunizations include measles, mumps, rubella, varicella, meningococci and diphtheria, tetanus, pertussis. Refer to the national immunization scheme.
  - Arrange appointment for upcoming immunization.
- Schedule next well-child visit appointment

3.9 Well-child visit: 3 years

- Follow up development, growth and vaccinations
- Counsel on nutrition, activity and safety

History

- Serious illnesses since last check-up
- Care situation and exceptional burdens in the family
- Eating problems (p. 552)
- Abnormal stools
- Day-time bladder control and coordination, bowel control
- Vision or hearing problems
- Regular snoring
- Speech development difficulties
- Risk factors for developmental difficulty (p. 61).

Examination

- Perform a complete physical examination (p. 15). Look for signs of acute illness or chronic conditions:
  - **Growth:** measure body weight, height and head circumference (p. 21) and confirm the z-score according to the WHO growth charts (Annex 3). If abnormal growth, e.g. weight-for-height < -2 SDs or > +2 SDs, see p. 511–p. 523.
  - **Skin:** pallor (p. 403), rash (p. 386), signs of injuries, e.g. bruises
  - **Head and neck:** nystagmus, strabism (Corneal light reflex), pupils of different size or non-reactive, visual acuity (p. 439), teeth abnormalities
  - **Respiration:** tachypnoea, retractions, abnormal breath sounds
  - **Cardiovascular:** tachycardia, arrhythmia, heart murmur (p. 325)
  - **Abdomen:** enlarged liver or spleen, masses, hernias
  - **Musculoskeletal and neurological:** asymmetrical movement, abnormal muscle tone, absent or diminished muscle reflexes
  - **Development:** assess developmental milestones (Table 13). If milestones are not met or risk factors for developmental difficulties are present, see p. 64. for management

— **Signs of child abuse or neglect:** poor hygiene, unusual presence of injuries and bruises not matching the given explanation (p. 638)

Table 13. Developmental milestones 36 months

Domains	What to expect by age 36 months
Expressive language How does your child let you know when they want something? What sounds, gestures words do they use?	• Uses sentences with 3 words to communicate • Uses pronouns ("I", "me", "you") • Caregivers understand most of child's communication
Receptive language How does your child show you that they understand when you talk to them?	• Understands one preposition (other than "in") such as "under" or "on top"
Gross (large) movements Tell me about their movements, like holding and raising the head, sitting.	• Climbs, jumps
Fine movements What does your child do with their hands, like holding objects?	• Manipulates even very small objects using a precise three-fingered grip (thumb, index finger, middle finger)
Relating to others How does your child relate to familiar people? How do they show interest in them? What do they do to engage them? How is their eye contact?	• Initiates increasingly warm interactions with people
Play activities Tell me about your child's play. How do they play with people, with objects or toys?	• Involves others in play
Self-help activities What does your child do on its own, like feeding?	• Uses one feeding utensil • Takes a piece of clothing off • Washes hands with assistance 

Counselling

- Counsel on:
  - Nutrition (p. 81)
  - Oral hygiene and caries prevention (p. 101)
  - Physical activity, sedentary behaviour and sleep (p. 102–p. 104)
    - Various physical activities for at least 180 minutes throughout the day, with at least 60 minutes of moderate-to-vigorous intensity activity
    - Limit the amount of time spent sedentary, particularly recreational screen time ≤ 1 hour
    - 10–13 hours of good quality sleep
  - Supporting early childhood development (p. 60)
  - Sun protection (p. 104)
  - Injury prevention (p. 106).
- Check and complete immunization status (p. 68)
  - Routine immunizations include diphtheria, tetanus, pertussis. Refer to the national immunization scheme.
- Schedule next well-child visit and immunization appointment

3.10 Well-child visit: 4 years

- Follow up development, growth and vaccinations
- Counsel on nutrition, activity and safety

History

- Serious illnesses since last check-up
- Care situation and exceptional burdens in the family
- Vision or hearing problems
- Regular snoring
- Day-time bladder control and coordination, bowel control
- Speech development difficulties
- Risk factors for developmental difficulty (p. 61)

Examination

- Perform a complete physical examination (p. 15). Look for signs of acute illness or chronic conditions:
  - **Growth:** measure body weight, height and head circumference (p. 21) and confirm the z-score according to the WHO growth charts (Annex 3). If abnormal growth, e.g. weight-for-height < -2 SDs or > +2 SDs, see p. 511–p. 523.
  - **Skin:** pallor (p. 403), rash (p. 386), signs of injuries, e.g. bruises
  - **Head and neck:** nystagmus, strabism (cornea light reflex), pupils of different size or non-reactive, visual acuity (p. 439), teeth abnormalities
  - **Respiration:** tachypnoea, retractions, abnormal breath sounds
  - **Cardiovascular:** tachycardia, arrhythmia, heart murmur (p. 325)
  - **Abdomen:** enlarged liver or spleen, masses, hernias
  - **Musculoskeletal and neurological:** abnormal curvature of the spine, limping, asymmetrical posture, absent or diminished muscle reflexes, signs of rickets (p. 425)
  - **Development:** assess developmental milestones (Table 14). In the event of development difficulties, see p. 565.
  - **Signs of child abuse or neglect:** poor hygiene, unusual presence of injuries and bruises not matching the given explanation (p. 638)

Table 14. Developmental milestones 4 years

Domains	What to expect by age 4 years
Language	• Uses sentences of at least six age-appropriate words • Tells stories in a logical sequence • Asks "why", "how", "where", "how come"
Gross (large) movements	• Jumps over a piece of paper (20–50 cm wide)
Fine movements	• Holds a pen properly with three fingers • Draws closed circles
Relating to others	• Tolerates mild disappointments
Play activities	• Plays with other children of the same age (role play, follows rules)
Self-help activities	• (Un)dresses with no help

Counselling

- Counsel on:
  - Nutrition (p. 81)
  - Oral hygiene and caries prevention (p. 101)
  - Physical activity, sedentary behaviour and sleep (p. 102–p. 104)
    - Various physical activities for at least 180 minutes throughout the day, with at least 60 minutes of moderate-to-vigorous intensity activity
    - Limit the amount of time spent sedentary, particularly recreational screen time ≤ 1 hour
    - 10–13 hours of good quality sleep
  - Sun protection (p. 104)
  - Injury prevention (p. 106)
- Check and complete immunization status (p. 68)
  - Routine immunizations include diphtheria, tetanus, pertussis. Refer to the national immunization scheme.
- Schedule next well-child visit and immunization appointment

3.11 Well-child visit: 5 years

- Follow up development, growth and vaccinations
- Counsel on nutrition, physical activity and safety

History

- Serious illnesses since last check-up
- Care situation and exceptional burdens in the family
- Day-time bladder control and coordination (p. 361)
- Vision or hearing problems
- Risk factors for developmental difficulty (p. 61)

Examination

- Perform a complete physical examination (p. 15). Look for signs of acute illness or chronic conditions:
  - **Growth:** measure body weight, height and head circumference (p. 21) and confirm the z-score according to the WHO growth charts (Annex 3). If abnormal growth, e.g. weight-for-height < -2 SDs or > +2 SDs, see p. 511–p. 523.
  - **Skin:** pallor (p. 403), rash (p. 386), signs of injuries, e.g. bruises
  - **Head and neck:** nystagmus, pupils of different size or non-reactive, strabism (cornea light reflex), visual acuity (p. 439), teeth abnormalities
  - **Respiration:** tachypnoea, retractions, abnormal breath sounds
  - **Cardiovascular:** tachycardia, arrhythmia, heart murmur (p. 325)
  - **Abdomen:** enlarged liver or spleen, masses, hernias
  - **Musculoskeletal and neurological:** abnormal curvature of the spine, limping, asymmetrical posture, absent or diminished reflexes
  - **Development:** assess developmental milestones (Table 15). In the event of development difficulties, see p. 565.
  - **Signs of child abuse or neglect:** poor hygiene, unusual presence of injuries and bruises not matching the given explanation (p. 638)

Table 15. Developmental milestones 5 years

Domains	What to expect by age 5 years
Language	• Tells stories in a correct logical and chronological order in simple correct sentences • Nearly flawless pronunciation
Gross (large) movements	• Walks up- and downstairs facing forwards and using adult steps, without holding on • Jumps and stands briefly on one leg • Catches large balls
Fine movements	• Holds pen like an adult, draws rectangle and triangle when shown how to
Relating to others	• Tolerates mild disappointments
Play activities	• Plays with other children, willing to share (role play, pretends to be an animal)

Counselling

- Counsel on:
  - Nutrition (p. 81)
  - Oral hygiene and caries prevention p. 101
  - Physical activity, sedentary behaviour and sleep (p. 102–p. 104)
    - Various physical activities for at least 180 minutes throughout the day, with at least 60 minutes of moderate-to-vigorous intensity activity
    - Avoid restraint for > 1 hour at any one time
    - Limit the amount of time spent sedentary, particularly recreational screen time ≤ 1 hour
    - 10–13 hours of good quality sleep
  - Sun protection (p. 104)
  - Injury prevention (p. 106).
- Check and complete immunization status (p. 68)
  - Routine immunizations include diphtheria, tetanus, pertussis. Refer to the national immunization scheme.
- Schedule next well-child visit and immunization appointment.

3.12 Well-child visit: 8 years

- Follow up development, growth and vaccinations
- Counsel on nutrition, physical activity and safety

History

- Serious illnesses since last check-up
- Care situation and exceptional burdens in the family
- Day and night-time bladder control and coordination (p. 361)
- Vision or hearing problems
- Inadequate interaction with teachers, friends and parents
- Behavioural or learning problems (p. 540)

Examination

- Perform a complete physical examination (p. 15). Look for signs of acute illness or chronic conditions:
  - **Growth:** measure body weight and height and confirm the z-score according to the WHO growth charts (Annex 3). If abnormal growth, e.g. BMI-for-age < -2 SDs or > +1 SDs, see p. 511–p. 523
  - **Skin:** pallor (p. 403), rash (p. 386), signs of injuries, e.g. bruises
  - **Head and neck:** nystagmus, pupils of different size or non-reactive, visual acuity (p. 439), teeth abnormalities, enlarged lymph nodes
  - **Respiration:** tachypnoea, retractions, abnormal breath sounds
  - **Cardiovascular:** tachycardia, arrhythmia, heart murmur (p. 325)
  - **Abdomen:** enlarged liver or spleen, masses, hernias
  - **Musculoskeletal and neurological:** abnormal curvature of the spine, limping, asymmetrical posture, absent or diminished muscle reflexes
  - **Signs of child abuse or neglect:** poor hygiene, unusual presence of injuries and bruises not matching the given explanation (p. 638).

Counselling

- Counsel on:
  - Nutrition (p. 81)
  - Oral hygiene and caries prevention with fluoride (p. 101)
  - Physical activity, sedentary behaviour and sleep (p. 102–p. 104)
    - Various physical activities of moderate-to-vigorous intensity for at least 60 minutes per day
    - Limit the amount of time spent sedentary, particularly recreational screen time ≤ 2 hours, including computers and video games
    - 9–12 hours of good quality sleep
  - Sun protection (p. 104)
  - Injury prevention (p. 106)
- Check and complete immunization status (p. 68)
  - Refer to the national immunization scheme.
- Schedule next well-child visit and immunization appointment

3.13 Well-child visit: 10 years

- Follow up development, growth and vaccinations
- Counsel on nutrition, physical activity and safety

History

- Serious illnesses since last check-up
- Care situation and exceptional burdens in the family
- Sleeping problems (p. 546)
- Inadequate interaction with teachers, friends and parents
- Concerns regarding puberty
- Behavioural or learning problems (p. 540)

Examination

- Perform a complete physical examination (p. 15). Look for signs of acute illness or chronic conditions:
  - **Growth:** measure body weight and height and confirm the z-score according to the WHO growth charts (Annex 3). If abnormal growth, e.g. BMI-for-age < -2 SDs or > +1 SDs, see p. 511–p. 523
  - **Pubertal stage:** signs of puberty age-appropriate (p. 673)
  - **Skin:** acne (p. 703), pallor (p. 403), rash (p. 386), signs of injuries, e.g. bruises
  - **Head and neck:** nystagmus, pupils of different size or non-reactive, visual acuity (p. 439), teeth abnormalities, enlarged lymph nodes
  - **Respiration:** tachypnoea, retractions, abnormal breath sounds
  - **Cardiovascular:** tachycardia, arrhythmia, heart murmur (p. 325)
  - **Abdomen:** enlarged liver or spleen, masses, hernias
  - **Musculoskeletal and neurological:** abnormal curvature of the spine, limping, asymmetrical posture, absent or diminished muscle reflexes
  - **Signs of child abuse or neglect:** poor hygiene, unusual presence of injuries and bruises not matching the given explanation (p. 638).

Counselling

- Counsel on:
  - Nutrition (p. 81)
  - Oral hygiene and caries prevention with fluoride (p. 101)
  - Physical activity, sedentary behaviour and sleep (p. 102–p. 103)
    - Various physical activities of moderate-to-vigorous intensity for at least 60 minutes per day
    - Limit the amount of time spent sedentary, particularly recreational screen time ≤ 2 hours, including computers and video games
    - 9–12 hours of good quality sleep
  - Sun protection (p. 104)
  - Injury prevention (p. 106)
  - Sexuality, physical and sexual maturation (p. 677)
- Check and complete immunization status (p. 68)
  - Routine immunizations include diphtheria, tetanus, pertussis, human papillomavirus. Refer to the national immunization scheme.
- Schedule next well-child visit and immunization appointment.

3.14 Well-child visit: 12 years

- Follow up development, growth, pubertal stage and vaccinations
- Offer support to caregivers and adolescents
- Counsel on nutrition, physical activity and safety
- Review the adolescent's health behaviour and lifestyle and discuss any behavioural issues they bring up
- Tell the caregivers that for part of the visit you will talk to the adolescent alone (p. 668)
- Ensure confidentiality, obtain consent and assess competence (p. 666)

History

- ▶ Carry out a HEEADSSSS assessment (p. 670)
- ■ Serious illnesses since last check-up
- ■ Care situation and exceptional burdens in the family
- ■ Problems with sleeping (p. 546) or school performance
- ■ Inadequate interaction with teachers, friends and parents
- ■ Concerns regarding puberty (p. 673)
- ■ Behaviour, habits and environment
- ■ Smoking, alcohol consumption, other substances (p. 649)
- ■ Learning problems

Examination

- ▶ Perform a complete physical examination (p. 672). Look for signs of acute illness or chronic conditions:
  - — **Growth:** measure body weight and height and confirm the z-score according to the WHO growth charts (Annex 3). If abnormal growth, e.g. BMI-for-age < -2 SDs or > +1 SDs, see p. 511–p. 523.
  - — **Pubertal stage:** signs of puberty age-appropriate (p. 673)
  - — **Skin:** acne (p. 703), pallor (p. 403), rash (p. 386), signs of injuries, e.g. bruises
  - — **Head and neck:** nystagmus, pupils of different size or non-reactive, visual acuity (p. 439), teeth abnormalities, enlarged lymph nodes or thyroid gland (p.433)

- **Respiration:** tachypnoea, retractions, abnormal breath sounds
- **Cardiovascular:** tachycardia, arrhythmia, heart murmur (p. 325)
- **Abdomen:** enlarged liver or spleen, masses, hernias
- **Musculoskeletal and neurological:** abnormal curvature of the spine, limping, asymmetrical posture, absent or diminished muscle reflexes
- **Signs of child abuse or neglect:** poor hygiene, unusual presence of injuries and bruises not matching the given explanation (p. 638)

Counselling

- Counsel on:
  - Nutrition (p. 81)
  - Oral hygiene and caries prevention (p. 101)
  - Physical activity, sedentary behaviour and sleep (p. 102–p. 104)
    - Various physical activities of moderate-to-vigorous intensity for at least 60 minutes per day
    - Limit the amount of time spent sedentary, particularly recreational screen time ≤ 2 hours, including computers and video games
    - 9–12 hours of good quality sleep
  - Sun protection (p. 104)
  - Injury prevention (p. 106)
  - Sexuality, physical and sexual maturation and contraception (p. 677), depending on maturity
  - Substance use (tobacco, alcohol, other substances) (p. 649)
- Check and complete immunization status (p. 68)
  - Routine immunizations include diphtheria, tetanus, pertussis, human papillomavirus. Refer to the national immunization scheme.
- Schedule next well-child visit and immunization appointment.

3.15 Well-child visit: 14 years

- Follow up development, growth, pubertal stage and vaccinations
- Offer support to caregivers and adolescents
- Counsel on nutrition, physical activity and safety
- Review health behaviour and lifestyle and discuss any behavioural issues they bring up
- Tell the caregivers that for part of the visit you will talk to the adolescent alone (p. 668)
- Ensure confidentiality, obtain consent, assess competence (p. 666)

History

- ▶ Carry out a HEEADSSSS assessment (p. 670)
- ■ Serious illnesses since last check-up
- ■ Care situation and exceptional burdens in the family
- ■ Problems with sleeping (p. 546) or school performance
- ■ Inadequate interaction with teachers, friends and parents
- ■ Problems with menstruation (p. 700) or contraception (p. 680)
- ■ Behaviour, habits and environment (see HEEADSSSS assessment, p. 670)
- ■ Smoking, alcohol consumption, other substances (p. 649)
- ■ Learning problems

Examination

- ▶ Perform a complete physical examination (p. 672). Look for signs of acute illness or chronic conditions:
  - — **Growth:** measure body weight and height and confirm the z-score according to the WHO growth charts (Annex 3). If abnormal growth, e.g. BMI-for-age < -2 SDs or > +1 SDs, see p. 511–p. 523
  - — **Pubertal stage:** signs of puberty age-appropriate (p. 673)
  - — **Skin:** pallor (p. 403), rash (p. 386), signs of injuries, e.g. bruises, acne (p. 703)
  - — **Head and neck:** nystagmus, pupils of different size or non-reactive, visual acuity (p. 439), teeth abnormalities, enlarged lymph nodes or thyroid gland (p. 433)

- **Respiration:** tachypnoea, retractions, abnormal breath sounds
- **Cardiovascular:** tachycardia, arrhythmia, heart murmur (p. 325)
- **Abdomen:** enlarged liver or spleen, masses, hernias
- **Musculoskeletal and neurological:** abnormal curvature of the spine, limping, asymmetrical posture, absent or diminished muscle reflexes
- **Signs of abuse or neglect:** poor hygiene, unusual presence of injuries and bruises not matching the given explanation (p. 638)

Counselling

- Counsel on:
  - Nutrition (p. 81)
  - Oral hygiene and caries prevention (p. 101)
  - Physical activity, sedentary behaviour and sleep (p. 102–p. 104)
    - Various physical activities of moderate-to-vigorous intensity for at least 60 minutes per day
    - Limit the amount of time spent sedentary, particularly recreational screen time ≤ 2 hours, including computers and video games
    - 9–12 hours of good quality sleep
  - Sun protection (p. 104)
  - Injury prevention (p. 106)
  - Sexuality, physical and sexual maturation and contraception (p. 677)
  - Substance use (tobacco, alcohol, other substances) (p. 649)
- Check and complete immunization status (p. 68)
  - Routine immunizations include diphtheria, tetanus, pertussis, human papillomavirus. Refer to the national immunization scheme.

CHAPTER 4

Health promotion and disease prevention

Health promotion is the process of empowering parents and children to increase control over their health and to encourage healthy behaviour, e.g. healthy nutrition, promotion of early childhood development, oral health and mental health.

Primary prevention refers to actions aimed at avoiding the manifestation of a disease or other unfavourable events, e.g. vaccination, reducing overweight.

Secondary prevention deals with early detection when this improves the likelihood of a positive health outcome, e.g. metabolic screening and other evidence-based screening programmes for early detection of diseases.

Tertiary prevention aims to reduce the negative impact of a known condition or disease that has lasting effects by restoring function, improving quality of life and reducing disease-related complications, e.g. treating the disease and providing rehabilitation following significant illness.

4.1 Early childhood development

Early childhood development starts from conception and defines the first three years of life. This concept includes the child's cognitive, social and emotional functioning, communication and language, relating to others, gross and fine movement, play, self-help, activities and participation in life as well as family- and community-related factors that affect the child.

Developmental difficulties in early childhood range from difficulties in development due to common preventable conditions such as lack of responsive caregiving, iron deficiency and undernutrition, to neuro-developmental disorders such as cerebral palsy (p. 578) or autism (p. 569).

Adverse experiences in early childhood may affect brain development and long-term physical and mental health during adulthood. Children's development may need extra support because of the presence of health-related or psychosocial risk factors.

This chapter is organized to allow primary health care providers to:

- Monitor development and support children's development and to determine if there are any areas that need extra support
- Identify and address risk factors for developmental difficulties
- Deal with developmental difficulties when they manifest.

Specific conditions that can coexist with developmental difficulties and their management are outlined in Chapter 7.

Developmental assessment and monitoring

Assess for risk factors for developmental difficulties (Table 16)

▶ Develop rapport with the family first before discussing psychosocial risk factors and difficulties in the family situation. Ask: "Sometimes people can feel overwhelmed, stressed or depressed, there may be financial problems or illness in the family, and caregivers find it hard to support their child's development. Are there any such difficulties in your family?"

Assess responsive caregiving and early learning opportunities

▶ Learn about who provides care for the child, and how caregivers, parents and other family members support the child's development. Ask: "What do you and your family do at home, in your daily life, to help your child develop, learn and communicate?"

Table 16. Risk factors for developmental difficulties

Psychosocial and environmental risk factors	Health-related risk factors
• Physical and mental illness in the family (e.g. maternal depression) • Substance abuse • Poverty • Exposure to toxins (smoke, alcohol, lead, mercury, pollution) • Inadequate housing • Deficiencies in responsive caregiving and nutrition • Deficiencies in early learning environment • Family conflicts or domestic violence • Exposure to violence or war • Displacement • Homeless, living in institution, separated from parents • Low caregiver education	• Low birth weight < 2500 g or prematurity < 37 weeks • Perinatal problems including perinatal asphyxia • Severe jaundice • Central nervous system conditions such as meningitis, trauma or convulsions • Undernutrition • Iron and iodine deficiency • Hearing and vision impairment • Congenital, genetic, metabolic, endocrine and other chronic conditions • Parental consanguinity

Monitor and assess developmental milestones and the different domains of development

- Table 17 indicates the ages by which most children (85%) have attained certain developmental milestones.
- If milestones are not attained by the indicated age, children may benefit from additional support and early intervention.
- All milestones from the previous age groups should still be present. A regression or lost milestone is a concern.

- Monitor developmental milestones and the different domains of development at well-child visits at least around 6 months, 1 year, 2 years and 3 years (Table 17).
- Use corrected age for premature infants (gestational age < 37 weeks), when assessing development up to 2 years. Use the formula: corrected age = computed age (current date – birth date) – correction for prematurity (40 weeks – gestational age in weeks).

Table 17. Developmental milestones

Domains	What to expect by 6 months	What to expect by 14 months
Expressive language	• Laughs aloud • Vocalizes vowels (“aa”, “uu”)	• Babbles by repeating many syllables • Says one meaningful word • Uses arm or hand to point to people or objects
Receptive language	• Responds by making sounds when caregivers talk	• Understands: action words (“come”, “take”, “stop”), names of objects (“ball”, “toy”) and familiar people (“mummy”, “daddy”)
Gross (large) movements	• Lifts head 90° (prone) • When held erect, straightens legs, pushes against object • Sits with support • Actively changes positions (rolls over)	• Sits steady without support (by 10 months) • Pulls to stand holding on to objects • Stands alone momentarily • Walks holding onto objects 
Fine movements	• Reaches for objects (toys) with hands • Holds, handles objects	• Picks up small objects using thumb and index finger
Relating to others	• Has prolonged, meaningful eye contact • Shows recognition and desire to engage with caregivers by reaching, smiling, inspecting faces	• Spontaneously seeks to share enjoyment and interest with others (cuddles caregiver, kisses, inspects toy together) • Shows recognition of stranger (turns away, stares)
Play activities	• Makes sounds in response to face-to-face play • Brings toys/objects to mouth	• Curiously inspects toys/objects (how wheels turn, doll moves, bells ring, lights turn on) • Makes gestures on request • Imitates game “peek-a-boo” and gestures during play (claps hands, makes face)
Self-help activities	• Not expected to attain self-help milestones	• Uses fingers for feeding (knows it is food and eats it)

What to expect by 24 months	What to expect by 36 months
• Uses at least 2 meaningful words • Uses index finger to point • Caregivers understand some of child's communication	• Uses sentences with 3 words to communicate • Uses pronouns ("I", "me", "you") • Caregivers understand most of child's communication
• Waves "bye" or uses other common gesture in response to command • Understands one simple command (bring shoes)	• Understands one preposition (other than "in") such as "under" or "on top"
• Walks alone (by 18 months) • Kicks ball or another object	• Climbs, jumps
• Holds pencil or stick (in any way) and scribbles on paper or ground/floor 	• Manipulates even very small objects using a precise three-fingered grip (thumb, index finger, middle finger)
• Initiates specific interactions with people • Imitates other people's behaviour (waves back, scribbles, washes hands, stacks clothes in imitation)	• Initiates increasingly warm and varied interactions with people
• Inspects how toys/objects work (how doll moves, bells ring) • Has simple imaginary play like feeding doll, driving cars, riding animals	• Involves others in play • Has complex imaginary play
• Uses fingers for feeding (knows it is food and eats it) • May use one feeding utensil	• Uses one feeding utensil • Takes a piece of clothing off • Washes hands with assistance

- Observe the child. Do not "test" the child for developmental milestones. Children may be shy, timid or scared and not "perform" on demand.
- Ask parents or caregivers if they have concerns about their child's development (use open-ended questions):

Expressive language: how does your child let you know when they want something? What sounds, gestures words do they use?

Receptive language: how does your child show you that they understand when you talk to them?

Gross (large) movements: tell me about your child's movements, like holding and raising the head, sitting, walking.

Fine movements: what does your child do with their hands, like holding objects?

Relating to others: how does your child relate to familiar people? How do they show interest in them? What do they do to engage them? How is their eye contact?

Play activities: tell me about your child's play. How do they play with people, with objects or toys?

Self-help activities: what does your child do on his/her own, like feeding? Note: ages at which children attain self-help skills may vary across cultures depending on the opportunities presented to them.

Management

- Be respectful of the cultural background, priorities and beliefs of the child and family.
- Practise supportive listening.
- Caregivers will partner with you readily if you acknowledge, praise and support their efforts and strengths.

If all milestones are met and there are no health-related or psychosocial risk factors

- Provide feedback on development, support caregivers by praising their efforts.
- Counsel on how to support development further (p. 66) and provide appropriate nutritional advice, e.g. introduction of complementary foods at 6 months of age (p. 89).

If health-related or psychosocial risk factors are present

- Address health-related or psychosocial risk factors:
  - — Provide additional support and refer to specialized services when needed. Refer to available resources in the community such as social support services
  - — Address health-related risk factors such as hearing loss and iron deficiency (p. 409)
  - — Help children and families notice and use their own individual strengths and resources to deal with stressors.

If milestone(s) are not met

- Be alert and identify those in need of early intervention and support, but do not cause unnecessary parental anxiety
- Support and counsel caregivers to provide additional support and activities to help their child develop (p. 66)
- Address health related or psychosocial risk factors (see above)
- Follow up again in one month:
  - — If milestones are met at follow-up continue to promote responsive caregiving and check again at next regular well-child visit
  - — If milestones are not met at follow-up or risk factors cannot be addressed, refer for developmental assessment and services. While waiting for specialist assessment, continue to provide support and feedback on development: make a plan together with the caregivers to ensure the child receives additional support. Review progress latest after two months and continue following the child at regular intervals (well-child visits).
- See p. 64 for management of developmental difficulties.

If previously achieved milestones are lost

- Refer for a comprehensive developmental assessment and services. While waiting for specialist assessment, continue to provide the following support:
  - — Provide feedback on development and draw up a plan with caregivers to ensure the child receives additional support
  - — Review progress at the latest after two months and continue following the child at regular intervals (well-child visits, see Chapter 3).

Counselling box 1. Early childhood development

Supporting early childhood development

Brain development and learning depend on responsive caregiving and experiences in early childhood. Negative experiences may affect your child's brain development and lead to long-term physical and mental health problems later in life.

Positively influence and support your child's development

- Build a trusting, stable and healthy relationship with your child
- Engage in everyday activities such as smiling, talking, cuddling and singing to your child.
- Protect your child from violence and injuries
- Recognize illness and seek care.

Ensure supportive and emotionally responsive caregiving

- Be sensitive and responsive to your child's needs for nutrition, safety, engagement, soothing, play and communication
- Observe, recognize and respond to your child's cues, signals, behaviour, movements, sounds, gestures and verbal requests
- Respond lovingly and predictably. Be prompt, consistent and appropriate in your reactions.

Support early learning

- Engage in early learning activities with your child especially during the first 3 years of life: tell or read stories to your child, enrich learning through play
- Ensure quality in the early learning environment in the home and later in preschool and school.

Adopt positive parenting techniques

- Use appropriate practices such as sensitive discipline and limit-setting
- Provide praise and do not use harsh discipline and coercion.

Promotion of early childhood development in all children

- Provide information to caregivers about their child's development:
  - Development includes learning, communicating, understanding, relating to people, moving, using hands and fingers, hearing and vision
  - The age at which children learn skills such as how to walk varies greatly. Parents should never put pressure on their child: every child develops at their own pace and will learn new skills when ready.
  - Children's development needs support, especially if risk factors are present, so that the child can develop secure attachment and emotional, behavioural and cognitive capacities.
  - It is equally important to follow and support the child's development as it is to monitor their physical health and growth.
- Provide general caregiving advice. Counsel on:
  - How to support their child's early childhood development and early learning (Counselling box 1).
  - Age-appropriate feeding and nutrition including breastfeeding (p. 81).
  - The importance of establishing daily routines, e.g. going to bed, meal times.
- Consider referral for psychosocial interventions to support maternal mental health (e.g. depression and anxiety): e.g. parent groups, psycho-education and cognitive behavioural therapy.
- Consider referral for parenting classes to support caregiving, if needed.
- Schedule follow-up (next well-child visit).

4.2 Vaccinations

Vaccines reduce suffering and save lives. Over half of the 30% drop in childhood mortality in the world since 1990 is attributable to immunization.

Make sure that the child receives vaccines at the recommended age according to the national vaccination schedule.

DO NOT miss the opportunity to check whether the child's vaccines are up to date at every well-child visit. Table 18 provides a summary of the WHO vaccination recommendations for children and adolescents. The table is a guide (as of September 2020) and not intended for direct use by health care workers. Refer to your country's national vaccination schedule.

- Ask the caregiver to always bring the child's vaccination card or other health record along. If the caregiver forgets to bring it, they may be able to tell you when the last vaccination took place.
- Document each vaccination in the child's vaccination card or other health record.
- Advise the caregiver when to bring the child for the next vaccination.
- Live vaccines (e.g. MMR, varicella) can be administered simultaneously or separated by 28 days. Inactivated vaccines can be administered irrespective of other vaccinations.
- Every dose counts. There is no need to restart an interrupted primary vaccination series from the beginning. Resume without repeating previous doses.
- Special considerations may apply in the event of delayed immunization. For most vaccines the number of doses and time interval between doses remain the same. See Table 19, p. 72, where exceptions apply.
- For further considerations concerning routine immunizations see Table 19, p. 72.

Table 18. WHO – recommended routine immunizations for children and adolescents

Antigen	Doses in primary series	Age of first dose	Minimum interval between doses	Booster doses
Recommendations for all children and adolescents				
BCG (Bacillus Calmette Guérin)	1 dose (intradermal)	As soon as possible after birth (< 48h)		
Hepatitis B	3–4 doses: birth dose + 2–3 doses with DTPCV	As soon as possible after birth (< 48h)	4 weeks 1st to 2nd; 5 months 2nd to 3rd	3 doses (for high-risk groups if not previously vaccinated)
Polio	4 doses bOPV+IPV	6 weeks	4 weeks	
	1–2 doses IPV and 2 doses bOPV (sequential)	8 weeks	4 weeks	
	3 doses IPV	8 weeks	4 weeks	If series begins < 2 months, at least 6 months after last dose
Diphtheria Tetanus Pertussis (DTP – containing vaccine (DTPCV)	3 doses	6 weeks (min.)	4 weeks	3 boosters: 12–23 months (DTPCV); 4–7 years (Td/DT containing vaccine); 9–15 years (Td containing) at least 4 years between boosters

Antigen	Doses in primary series	Age of first dose	Minimum interval between doses	Booster doses
***Haemophilus influenzae* type b**	3 doses with DTPCV	6 weeks (min.) 59 months (max.)	4 weeks	Booster is optional
	2 doses		8 weeks	At least 6 months after last dose
Pneumococcal (conjugate)	3 doses with DTPCV	6 weeks (min.)	4 weeks	
	2 doses with DTPCV		8 weeks	9–18 months; another booster if HIV+ or preterm neonate
Rotavirus	2 doses Rotarix or 3 doses RotaTeq or Rotavac with DTPCV	6 weeks (min.)	4 weeks	
Measles	2 doses	9 or 12 months	4 weeks	
Rubella	1 dose with measles	9 or 12 months (6 months min.)		
HPV (females only)	2 doses	As soon as possible from 9 years of age	6 months	
Recommendations for children in some high-risk populations				
Meningococcal meningitis A	1 dose	9–18 months		

Meningococcal meningitis C	2 doses	2–11 months	8 weeks	1 year after first dose
	1 dose	≥ 12 months		
Meningococcal quadrivalent	2 doses	9–23 months	12 weeks	
	1 dose	> 2 years		
Hepatitis A	At least 1 dose	> 1 year	6 to 18 months	
Recommendations for children living certain regions				
Tick-borne encephalitis	3 doses FSME-Immun and Encepur	> 1 year	1st to 2nd: 1–3 months; 2nd to 3rd: 12 months	At least 1 booster
	3 doses TBE_ Moscow and EnceVir	> 3 years	1st to 2nd: 1–7 months; 2nd to 3rd: 12 months	Every 3 years
Recommendations for immunization programmes with certain characteristics				
Mumps	2 doses with measles	12–18 months	4 weeks	
Varicella	1–2 doses	12–18 months	1 to 3 months depending on product	2 doses
Seasonal influenza (tri-or quadrivalent)	First use: 2 doses (< 9 years); 1 dose (≥ 9 years)	6 months (min.)	4 weeks	Revaccinate annually: 1 dose only

Table 19. Considerations for routine and delayed immunization

Antigen	Considerations
BCG	Recommended in countries with a high incidence of TB.
Hepatitis B	Low birth weight and premature infants should receive a birth dose which should not count as part of the primary series. Recommended for high-risk groups: frequent treatment with blood products, dialysis, diabetes, chronic liver disease, HIV, recipients of solid organ transplantation.
DTP-containing vaccine (DTPCV)	In the event of delayed immunization: children > 12 months should receive 3 doses with interval of at least 4 weeks between 1st and 2nd dose, and at least 6 months between 2nd and 3rd dose.
***Haemophilus influenzae* type b**	Single dose if > 12 months of age. In the event of delayed immunization: only 1 dose in children > 12 months of age; not recommended in healthy children > 5 years.
Pneumococcal (conjugate)	HIV-positive infants and preterm neonates who received their primary series < 12 months may benefit from a booster in their second year of life. In the event of delayed immunization: only 2 doses for children 1–5 years at high-risk
Rotavirus	Postpone vaccination in the event of ongoing acute gastroenteritis or fever with moderate to severe illness. In the event of delayed immunization: limited benefit in children > 24 months.
Measles	Consider a supplementary dose for infants from 6 months and those: • known to be HIV-infected or -exposed • from an internally displaced population or a refugee • at high risk of contracting measles (e.g. contacts of measles cases or in settings with increased risk of exposure during outbreaks such as day-care facilities).
Rubella	Adolescent girls should be vaccinated. Avoid vaccination during pregnancy.

Antigen	Considerations
HPV	Target: 9–14 years old girls, preferably before the onset of sexual activity. 3 doses if immunocompromised.
Seasonal influenza	Priority for risk groups: children aged 6 months to 5 years. Lower dosage for children 6–35 months.
Hepatitis A	Inactivated (1–2 doses IM) or live attenuated (1 dose SC). 2 doses preferred for high-risk groups: lifelong treatment with blood products, chronic liver disease, immunocompromised. Recommended for children with a high risk (see above) and those travelling to or living in regions where hepatitis A is widespread.
Tick-borne encephalitis	Recommended in geographical regions with a high incidence of tick-borne encephalitis.
Meningococcal A	In the event of delayed immunization: 2 doses in children < 9 months of age with 8-week interval; 1 dose of 5 µg in children up to 24 months.
Meningococcal C	In the event of delayed immunization: only 1 dose in children > 12 months of age.
Meningococcal quadrivalent	In the event of delayed immunization: only 1 dose in children > 12 months of age.

Counselling about vaccine-preventable diseases

Due to effective vaccination programmes, most people in industrialized countries have never suffered from vaccine-preventable diseases and many people believe that these diseases no longer pose a threat. You have a powerful influence on people's decision to vaccinate.

- Be well informed about common concerns associated with vaccination so you can provide scientifically valid advice.
- Address vaccination myths (p. 79)
- Listen and discuss the benefits and risks associated with vaccination and the risks for disease and complications that might result from withholding vaccination. You will find information to help you counsel parents, caregivers, children and adolescents in Table 20.

- If caregivers or children raise arguments against vaccination, the best approach is to listen to their concerns, explore their reasoning and then provide information appropriate to their circumstances and educational level. Provide adequate written handouts without pharmaceutical advertisements.
- Avoid downplaying concerns, respect differences of opinion and consider the personal, cultural and religious factors that might influence a person's decision about vaccination.
- Counsel on possible side-effects (p. 77).

Table 20. Consequences and complications of vaccine-preventable diseases in non-vaccinated children

Disease	Consequences and complications
Diphtheria	• Used to be one of the most feared diseases causing epidemics with a high case-fatality rate • Throat infection leads to weakness, nerve damage, heart failure and death (10%)
Tetanus	• Muscle spasms and seizures • High case-fatality rate even with intensive care • ~ 100% mortality without medical intervention
Pertussis (p. 206)	• Severe spasms of cough, pneumonia, convulsions and may result in brain damage • Very young infants: apnoea and cyanosis • Case-fatality rate: 2.8–4%
Poliomyelitis	• Used to be the leading cause of permanent disability before vaccines were introduced • ~ 1 in 20 develop paralytic poliomyelitis
***Haemophilus influenzae* type b**	Blood stream invasion causes secondary spread leading to: • Pneumonia, arthritis, osteomyelitis, cellulitis, epiglottitis and meningitis • Meningitis leads to brain damage, deafness (10–15%) and death (5%)

Disease	Consequences and complications
Measles (p. 246)	• Otitis media, croup, diarrhoea, pneumonia • Post-infectious measles encephalitis (~1–4 per 1000–2000 cases) • Subacute sclerosing panencephalitis (~1 per 10 000–100 000 cases) • Case-fatality rate: 0.01–6%, can be as high as 30%
Mumps (p. 238)	• Deafness (5 in 10 000 cases) • Mumps encephalitis (0.02–0.3% of cases) • Orchitis (20–30% of males) can lead to sterility
Rubella (p. 249)	Infection during early pregnancy may cause: • Miscarriage or fetal death • Congenital rubella syndrome: heart, eye and ear defects
Varicella (p. 254)	• Cerebellar ataxia (1 in 4000 cases) • Encephalitis (1 in 33 000 to 50 000 cases) • Death due to complications (1 in 40 000 cases)
Pneumo-coccal disease	• Febrile bacteraemia (case-fatality rate: 15–20%) • Meningitis (15–20% of cases result in permanent brain damage or deafness)
Meningo-coccal disease	• Severe life-threatening disease. • Invasive infection results in rapidly deteriorating septicaemia with circulatory failure and meningitis • Brain damage, deafness, amputations, skin loss (10%) and death (10%)
Hepatitis B (p. 415)	• Liver infection can become chronic and lead to cirrhosis, liver cancer and death
Rotavirus	• Leading cause of severe dehydrating diarrhoea in children < 5 years • Accounts for about 5% of all child deaths worldwide
Seasonal influenza	• Children aged < 5 years and particularly those < 2 years of age have a high burden of influenza
Hepatitis A	• Estimated case-fatality rate: 0.1%–2.1%.

Disease	Consequences and complications
Tick-borne encephalitis	• Important cause of viral CNS infections • 40% of encephalitic cases develop permanent CNS sequelae and post-encephalitis syndrome
Human papilloma virus (HPV)	• Genital warts, anal and oropharyngeal cancers • Cervical and vulvar cancer (women) and penile cancer (men)
Tuberculosis (p. 631)	• Predominantly pulmonary TB in children • Extrapulmonary TB: 30–40% of cases • Infants and young children at high risk of TB meningitis, miliary disseminated TB, associated with a high rate of childhood mortality
COVID-19 (p. 188)	• Follow current national guidelines for vaccination against COVID-19.

Administration of vaccines

See p. 792 on how to give intramuscular and subcutaneous injections.

Always obtain consent before vaccination.

Reduce pain from injections

- Be calm and reassuring to decrease anxiety.
- Ensure proper positioning according to the child's age. Younger children should be held sitting upright by their caregivers.
- Caregivers should be present at all times during vaccination.
- Breastfed infants should be breastfed during or shortly before or after vaccination.

DO NOT aspirate during intramuscular injections.

DO NOT warm the vaccine.

DO NOT stimulate the injection site by rubbing or pinching.

DO NOT use topical anaesthetics or give antihistamines or analgesic drugs before or at the time of vaccinations.

Prevent vaccination errors

Avoid vaccination errors, which can result from mishandling of vaccine preparation, storage, administration or communication:

- Transport and store vaccines and diluents correctly. DO NOT store vaccines with other substances in the same refrigerator.
- Use the correct diluent supplied by the manufacturer.
- Sterilize syringe or needle properly and practice appropriate hand hygiene (p. 776).

DO NOT reuse disposable syringe or needle or reconstituted vaccine.

DO NOT vaccinate those with a contraindication (see below).

DO NOT inject into buttocks.

DO NOT inadequately shake a vaccine vial.

DO NOT substitute drug for vaccine or diluent.

Possible side-effects of vaccines

Frequent minor local side-effects include local reactions (redness, swelling and pain) at the injection site. Low-grade fever can occur in the first 24–48 hours. After the combined MMR vaccines 5 to 10% of children have fever with or without a rash 8 to 10 days after the vaccination. This rash is neither dangerous nor contagious.

Severe vaccine-related complications are very rare and do not justify non-vaccination. The likelihood of complications and death from a vaccine-preventable disease and its treatment is far greater.

▶ Counsel how to treat commonly observed reactions to vaccinations during the days after vaccination (Counselling box 2).

Counselling box 2. Home treatment of common vaccine reactions

Home treatment of common vaccine reactions

Some children experience mild reactions to vaccines, such as pain at the injection site, rash or fever. Common side-effects are a sign of the immune system working to mount an effective and natural response against the disease. These reactions are normal, resolve quickly and are nothing to worry about.

Help minimize mild side-effects:

- Use a cool, wet cloth to reduce redness, soreness and swelling at the place the injection was given.
- Reduce any fever with a cool tepid sponge-bath.
- Give paracetamol to relieve pain or fever. Be sure that the dosage is correct!
- Give your child lots of extra liquid. It is normal for some children to eat less during the first 24 hours after vaccination.

Contraindications and misperceived contraindications

There are **only very few** contraindications to vaccinations:

All vaccines

- Severe allergic reaction (e.g. anaphylaxis) after a previous administration of vaccine

Live vaccines (MMR, varicella, BCG, yellow fever)

- Immunodeficiency, symptomatic HIV infection or AIDS

DTP

- Convulsions or shock within 3 days of a recent dose
- Recurrent uncontrollable convulsions
- Active disease of the central nervous system.

Oral polio

- Diarrhoea: give the vaccine, but DO NOT count this dose in the schedule. The child should receive an extra dose.

The following conditions are **NOT** contraindications:

Current medical conditions	Personal history
• Common viral gastrointestinal or respiratory infections • Epilepsy under anticonvulsant control • Stable neurological condition (e.g. cerebral palsy) • Chronic disease • Breastfeeding • Eczema, dermatosis, local skin infection • Immunodeficiency (for inactivated vaccines) • Recovery phase of an acute illness • Antibiotics or low-dose corticosteroid therapy • Low-grade fever	• Mild/moderate local reaction or low-grade/moderate fever after previous dose • Early developmental impairment • Preterm birth • Febrile seizures • Penicillin allergy • Latex allergy • Newborn jaundice • Recent exposure to an infectious disease
	Family history
	• Sudden infant death syndrome • Adverse events to vaccines • Seizures

Addressing vaccination myths

Address frequent misconceptions and concerns about vaccines which are often found on the internet and social media:

There is NO association between

- Vaccines (in particular MMR vaccine) and autism
- Vaccines and Guillain-Barré syndrome
- Vaccines and autoimmune syndromes
- Pertussis vaccine and brain damage.

"Vaccines contain foreign proteins"

Some vaccines are grown in egg cultures and should be given with caution to people with known egg allergy. Influenza and measles vaccines contain negligible amounts of egg protein and can be given to children with egg allergy.

"Vaccines can overwhelm the immune system"

Vaccines do not weaken the child's immune system but improve immunity by stimulating the defence mechanism that protects against diseases.

"Natural immunity is better than vaccine-acquired immunity"

Vaccines stimulate the natural immune response to mount an effective response against the disease. Choosing to acquire immunity through exposure to the infections can have serious outcomes, such as permanent central nervous system impairment with lifelong disabling consequences.

"Vaccines cause or worsen asthma and allergies"

There is no evidence that vaccines cause or worsen allergic diseases. All children with asthma should receive all recommended vaccines. The risk of allergic reactions to vaccines is very low.

"Infectious diseases are not serious"

Some people argue that infections are a normal part of growing up. However, vaccine-preventable diseases can be serious and fatal. Current generations have possibly not seen the devastating effects of diseases such as paralysing poliomyelitis.

4.3 Screening tests and monitoring

Newborn screening tests

- Screening for metabolic and endocrine disorders (p. 119)
- Assessment of developmental dysplasia of the hip (p. 141)
- Vision screening (red reflex examination) (p. 119)
- Hearing screening (p. 119)
- Pulse oximetry screening for congenital heart defects (p. 120).

Screening tests during childhood

Vision screening

Vision screening is an important part of paediatric care, as children often do not complain of visual or eye problems when these are present. All children should undergo regular age-adapted vision examinations for detecting amblyopia (p. 444), strabismus (p. 443) and refractive errors (p. 442).

Hearing screening

All newborns need a hearing screening (p. 119).

Children require a hearing assessment if they have:

- Delay in speech development
- Learning difficulties or developmental disorders
- Behavioural problems
- History of frequent ear infections
- Family history of hearing problems.

▶ Refer any child with these signs or risk factors for a hearing assessment by a specialist.

Cognitive, speech and developmental difficulties – see developmental milestone assessment (p. 62).

Growth monitoring (p. 20).

4.4 Nutritional counselling

Age-appropriate nutritional counselling is important to promote a healthy diet and to prevent all forms of malnutrition and other nutritional problems and eating disorders in children and adolescents.

Support the adequate nutrition of infants and children:

▶ Provide age-appropriate nutritional counselling and feeding recommendations aimed at parents and caregivers (Counselling box 3).

▶ Encourage and counsel on healthy diets (see below) and physical activity (p. 103) to decrease risk of overweight, obesity and other noncommunicable diseases.

▶ Monitor growth and BMI during routine well-child visits to screen for nutritional problems. See Growth monitoring, p. 20.

▶ Manage nutritional problems such as overweight, obesity (p. 517), malnutrition (p. 512) and eating disorders (p. 554) when they arise.

▶ Review dietary history and physical activity history especially in those with a family history of obesity, diabetes and other noncommunicable diseases or in those with a history of intrauterine growth restriction.

▶ Promote family adherence to a healthy behaviour including a healthy diet and regular physical activities.

Counselling box 3. Feeding recommendations

Feeding recommendations

From birth to 6 months of age

- Immediately after birth: come into skin-to-skin contact with your baby. Allow your child to take the breast within the first hour.
- Breastfeed as often as the child wants day and night, at least 8 times in 24 h. Frequent feeding produces more milk.
- If the child is < 1 week and low birth weight: feed at least every 2–3 h. Wake your child for feeding after 3 h.
- Do not give other fluids or foods. Breast milk is all your child needs.
- Look for signs of hunger: beginning to fuss, sucking fingers or moving lips.
- Add complementary foods if the child is > 4 months, appears hungry after breastfeeding and is not gaining enough weight.

6 to 12 months

- Breastfeed as often as the child wants day and night, at least 8 times in 24 h.
- Introduce complementary foods around 6 months. Give thick porridge or well mashed or finely chopped family foods, including foods from animal sources, fruit and vegetables. Start by giving 2–3 tablespoons and gradually increase quantity:
  - 3 times per day if breastfed
  - 5 times per day if not breastfed, plus 1–2 cups of formula milk.

12 months to 2 years

- Breastfeed as often as the child wants.
- Give a variety of mashed or finely chopped family foods including foods from animal sources and fruit and vegetables.
- Give at least 3–4 meals a day. Offer 1–2 snacks between meals. Continue to encourage, but do not force, your child to eat. Let your child try to eat unaided and help only if needed.

> 2 years

- Give a variety of foods to your child including foods from animal sources and fruit and vegetables.
- Give at least 3–4 meals a day. Offer nutritious snacks between meals twice a day.
- Talk with your child during meals and keep eye contact.
- Be patient if your child refuses new food, show that you like the food and offer “tastes” several times.

- Be aware of dyslipidaemias in children with a positive family history (e.g. familial hypercholesterolaemia). Dyslipidaemias may lead to early atherosclerotic disease, which must be prevented through lifestyle behaviour changes such as an appropriately balanced diet with high amounts of fruit and vegetable and by carefully considering reduction of fat- and cholesterol-rich foods. Refer to specialist if concerns about further management (e.g. to consider statins for children > 10 years).

Infant and young child feeding

Adequate nutrition through a healthy, balanced diet which meets all the nutritional needs of infancy and early childhood is fundamental for the development of each child. The period from birth to 2 years of age is a critical time to promote optimal growth, health and behavioural development.

- Encourage breastfeeding (see below).
- Identify possible feeding problems (p. 85).
- Counsel parents on feeding recommendations for their children (Counselling box 3).

Promoting and supporting breastfeeding

Breastfeeding is unparalleled in providing the ideal food for infants. Breast milk is safe, clean and contains antibodies which help protect the infant against many common childhood illnesses.

Children who are breastfed are less likely to become overweight or obese and less prone to develop diabetes later in life. Mothers who breastfeed also reduce their risk of developing breast and ovarian cancers.

To achieve optimal growth, development and health, it is recommended that:

- Infants should be exclusively breastfed from birth (within 1 hour of birth) until 6 months of age.
- Infants should receive adequate and safe complementary foods from 6 months of age while breastfeeding continues to meet their nutritional requirements (see Complementary feeding, p. 89).

Exclusive breastfeeding from birth is possible for most women who choose to do so. It is recommended for all children except for very few medical conditions (p. 92).

Counselling on breastfeeding

- Encourage mothers to breastfeed and discuss the importance of breastfeeding.
- Encourage and support mothers to:
  - — Establish skin-to-skin contact after birth.
  - — Initiate breastfeeding as soon as possible after birth.
  - — Maintain breastfeeding. Help them to overcome any difficulties (p. 86) and to practise responsive breastfeeding (positioning and attaching their babies, allowing babies to suck when hungry) without limiting breastfeeding times.
  - — Recognize and respond to their infants' cues for feeding.
- Counsel mothers on:
  - — Exclusive breast-milk feeding (no other food or fluids) unless medically indicated (p. 92).
  - — Breast-milk expression and returning to work (p. 90).
  - — Uses and risks of feeding bottles, teats and pacifiers (risk of infection).
  - — Safe formula-feeding for women who cannot breastfeed (p. 92).
- Refer mothers to breastfeeding resources (e.g. breastfeeding counselling in the community).
- Counsel the mother to find a breastfeeding position that is most comfortable for her and her child such as reclining or lying on her side. There is no need to change the position if the child is getting breast milk effectively and the mother is comfortable.

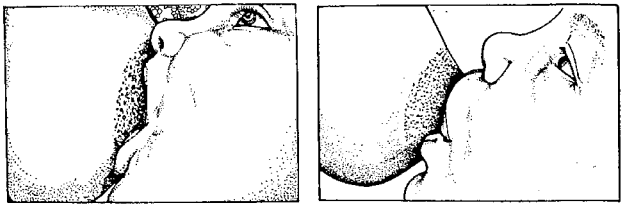
Laid-back breastfeeding position

Assessing a breastfeed

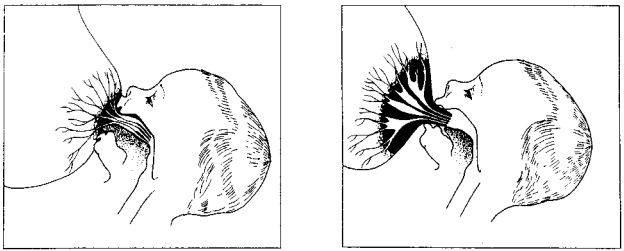
- Take a breastfeeding history by asking about the baby's feeding and behaviour.
- Observe the mother while breastfeeding to see whether she needs help.

Points to assess while the mother is breastfeeding her baby:

1. How is the baby attached to the breast? (see illustration)
   - — Signs of good attachment are:
   - — The pigmented area around the nipple (areola) is visible above the baby's mouth
   - — The baby's mouth is wide open
   - — The baby's lower lip is turned out
   - — The baby's chin is touching the breast.



Good (left) and poor (right) attachment of infant to the mother's breast



Good (left) and poor (right) attachment: cross-sectional view of breast and infant

2. How does the mother hold her baby? (see illustration)

   Signs of good positioning are:

   — The baby is held close to the mother
   — The baby faces the breast
   — The baby's body is in a straight line with the head
   — The baby's whole body is supported.

Good (left) and poor (right) positioning of infant for breastfeeding

Overcoming difficulties

"Not enough milk"

Almost all mothers can produce enough breast milk for one or even two infants; sometimes, however, a baby does not get enough breast milk. The signs are:

- Poor weight gain (< 500 g/month or < 125 g/week or baby weighing less than the birth weight after 2 weeks)
- Passing a small amount of concentrated urine (less than 6 times a day, yellow and strong-smelling)

Common reasons why a baby may not get enough breast milk are:

- Poor breastfeeding practices: poor attachment (very common cause); delayed start of breastfeeding; feeding at fixed times, no night feeds, short feeds; use of bottles, pacifiers, other foods and fluids

- Psychological factors in the mother: lack of confidence, worry, stress, depression, dislike of breastfeeding, rejection of baby, tiredness
- Mother's physical condition: chronic illness (e.g. TB, severe anaemia or rheumatic heart disease), contraceptive pill, diuretics, pregnancy, severe malnutrition, alcohol, smoking, retained piece of placenta (rare)
- Baby's condition: illness or congenital anomaly (such as cleft palate or congenital heart disease) that interferes with feeding.

A mother whose breast milk supply is reduced will have to increase it, while a mother who has stopped breastfeeding may need to relactate.

Help a mother to breastfeed again by:

- Encouraging the mother rather than other caregivers to look after the baby
- Ensuring plenty of skin-to-skin contact between mother and baby
- Offering the baby her breast whenever the baby is willing to suckle
- Expressing breast milk directly into the baby's mouth and positioning the baby to allow easy attachment to the breast
- Avoiding use of bottles, teats and pacifiers. If necessary, express the breast milk and give it by cup (p. 90). If this cannot be done, formula feeding may be needed until an adequate milk supply is established.

How to increase the milk supply

The main way to increase or restart the supply of breast milk is for the baby to suckle often in order to stimulate the breast.

- Give other feeds from a cup while waiting for breast milk to come. Do not use bottles or pacifiers. Reduce the other milk sources by 30–60 mL per day as the mother's breast milk starts to increase. Monitor the baby's weight gain.

Refusal or reluctance to breastfeed

The main reasons why a baby might refuse to breastfeed are:

- The baby is ill or in pain.
  - — If the baby is able to suckle, encourage the mother to breastfeed more often. If the baby is very ill, the mother may need to express breast milk and feed by cup or gastric tube until the baby can breastfeed again.
  - — If the baby is in hospital, arrange for the mother to stay with the baby in order to breastfeed.

  - — Help the mother to find a way to hold her baby without pressing on a painful place.
  - — Explain to the mother how to clear a blocked nose (p. 182). Suggest short feeds, more often than usual, for a few days.
  - — A sore mouth may be due to Candida infection (thrush) (p. 129) or teething. Encourage the mother of a teething baby to be patient and keep offering the breast.
- There is difficulty with the breastfeeding technique.
  - — Help the mother with her technique: ensure that the baby is positioned and attached well without pressing on the baby's head or squeezing the breast.
  - — Advise her not to use a feeding bottle or pacifier: if necessary, use a cup.
  - — Treat engorgement by removing milk from the breast; otherwise mastitis or an abscess may develop. If the baby is not able to suckle, help the mother to express her milk (p. 90).
  - — Help reduce oversupply. Babies who are poorly attached and ineffectively suckling may breastfeed longer or more often, and stimulate excess milk production. Oversupply may also occur if a mother tries to make her baby feed from both breasts at each feed when this is not necessary.
- A change has upset the baby.

  Changes such as separation from the mother, a new caregiver, illness of the mother, a change in the family routine or the mother's smell (due to a different soap, food or menstruation) can upset the baby and cause refusal to breastfeed.

Breast-milk expression and storage

If the mother is facing challenges, encourage and help her to continue breastfeeding by feeding expressed breast milk to her child. This may be necessary or helpful in the following situations:

- Mothers who have to return to work
- Babies who cannot breastfeed temporarily (e.g. due to sickness, low birth weight)
- Babies who have difficulty in coordinating sucking

- Relieving breast engorgement, blocked duct or milk stasis
- Preventing the nipple area from becoming dry and sore
- Keeping up the breast milk supply when a mother or baby is ill.

The most useful way for a mother to express milk is by hand. It needs no appliance, so she can do it anywhere and at any time. With a good technique, it can be very efficient. Early detection and correction of problems will help her maintain confidence in her ability to produce milk for her baby.

- Counsel all mothers on breast-milk expression and storage of breast milk in the refrigerator and freezer (Counselling box 4).
- Evaluate the mother's expression technique and whether it is effective.
- Address any issues or concerns she may have.
- Many mothers can express plenty of breast milk using unconventional techniques. If a mother's technique works for her, let her do it that way. But if a mother is having difficulty expressing enough milk, teach her an appropriate and effective expressing technique (Counselling box 4).
- If hand expression is difficult, a mother can use a manual or electric breast pump. Different types of pumps are available and their use depends on the model. When using a pump help mothers to use it correctly. Evaluate the mother's expression technique and whether it is effective.

Complementary feeding of the breastfed child

Around the age of 6 months, an infant's need for energy and nutrients starts to exceed what is provided by breast milk. Complementary foods should be combined with breastfeeding to meet those needs. An infant of this age is also developmentally ready for other foods. Energy needs are approximately 130 kcal per day at 6–8 months of age, 310 kcal per day at 9–11 months of age and 580 kcal per day at 12–23 months of age

- Counsel on complementary feeding (Counselling box 5).

Counselling box 4. Breast milk expression and storage

Breast-milk expression and storage

How to stimulate the release of your breast milk

- Maintain skin-to-skin contact with your baby or hold it on your lap while expressing. If not possible, look at your baby or at a photograph.
- Warm your breasts with a warm compress, water or by showering.
- Massage, stroke or gently pull the nipple lightly with your fingers or gently roll your fist over the breast towards the nipple.

How to prepare a container for expressed breast milk

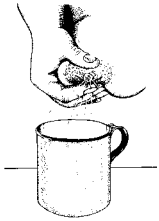
- Wash a cup, glass, jug or wide-mouthed jar with soap and water, sterilize it by pouring boiling water into it, and leave it for a few minutes before emptying it.

How to express breast milk by hand

1. Place finger and thumb on each side of the nipple area and press inwards towards your chest.
2. Press behind the nipple area with your finger and thumb.
3. Press from the sides to empty the entire breast.

Amount and frequency of expressing breast milk

- Express frequently (8 to 10 times in 24 hours including once at night) to maintain milk production.
- Develop a plan for expressing milk but stay flexible: you do not have to follow a strict routine but avoid long gaps (4 hours in the day, 6 hours at night) between expressions.
- If you return to work, express as much as possible before going to work which can be left for the baby while you are at work.



How to store expressed or pumped breast milk

- Breast milk is safe for up to 8 hours at room temperature, up to 4 days in the refrigerator and for 6 months in the freezer.

Counselling box 5. Complementary feeding

Complementary feeding

Start at the right time: As your baby grows he or she will need complementary foods around 6 months, when breastfeeding alone is no longer enough to provide your baby with all the needed energy and nutrients. These foods are important for your child's growth – if not, growth may falter.

Give the right food:

- Give complementary foods that provide sufficient energy, protein and micronutrients.
- Limit the amount of juice and **DO NOT** give tea, coffee and sugary soft drinks.
- Home-made foods are best. If you choose to feed your child commercial foods, check their nutritional quality. They are often marketed as healthy, when in fact they contain too much sugar, salt and calories.

Make sure the food is safe:

- Wash your and your child's hands before preparing food and eating.
- Store foods safely. Serve meals immediately after preparation.
- Use clean cutlery, cups and bowls to prepare and serve food.
- Avoid using feeding bottles and teats, which are difficult to clean.
- Avoid foods that may cause choking such as nuts, grapes, raw carrot until your baby learns how to eat.

Be responsive to your child's needs, hunger and fullness cues:

- Start complementary feeding with small amounts of food 2–3 times a day around 6 months while continuing to breastfeed
- Increase the quantity and frequency of meals as the child gets older: increase to 3–4 times daily between 9–11 months and 12–24 months while continuing to breastfeed
- Offer additional healthy snacks 1–2 times a day when your child is between 12 and 24 months.

Complementary feeding (continued)

- Gradually increase the consistency and variety of food:
  - By 6 months: offer pureed, mashed and semi-solid foods
  - By 8 months: offer "finger food" snacks
  - By 12 months: offer the same food the rest of the family eats.

During and after illness:

- Make sure your child drinks more than usual during illness. Breastfeed your child more frequently.
- Encourage the child (depending on age) to eat soft, varied and appetizing foods.
- After illness, give food more often than usual.

Infant formula feeding

Formula feeding should only be used if breastfeeding is not possible (see below).

Commercial infant formulas come in liquid and powdered forms.

- Babies younger than age 12 months should be fed infant formulas specifically designed to meet their nutritional needs.
- At age 12 months, the infant can be introduced to cow's milk.

Reasons for use of breast-milk substitutes

Infants:

- Metabolic diseases (maple syrup urine disease, phenylketonuria)
- Birth weight < 1500 g and < 32 weeks gestational age, if expressed breast milk does not fulfil caloric needs.

Mothers:

- Medication or substances that pass into breastmilk, such as opioids, anti-epileptic drugs
- Hepatitis B, hepatitis C
- HIV infection (while globally breastfeeding is recommended for mothers living with HIV, in Europe formula feeding is considered the safer option)
- Tuberculosis.

- Counsel on infant formula feeding (Counselling box 6).
- Counsel on the possibility of feeding preterm and low-birth-weight infants with human breast milk (expressed maternal, donor or both) fortified with energy (carbohydrate or fat), protein and micronutrients.

Promoting healthy diets in children and adolescents

A healthy, well-balanced diet – which includes a variety of unprocessed and fresh foods every day and is rich in vegetables and fruit and limited in saturated fat and trans fat, sodium and sugar – helps children and adolescents to:

- Obtain the right amounts of essential nutrients
- Achieve optimal growth and development
- Have a significantly lower risk of malnutrition and noncommunicable diseases later in life such as overweight and obesity, caries, heart disease, high blood pressure, stroke, diabetes and cancer.

Nutritional requirements during adolescence

Adolescents need a healthy diet to grow and develop, and to function optimally. Eating habits and nutritional requirements change and increase significantly during adolescence, because of two important transformations: growth and changes in body composition. Adolescents gain 20% of their adult height (mostly during the growth spurt) and 50% of their adult skeletal mass during the second decade of life. Additionally, adolescents have an increased need for:

- Iron because of the increase in blood volume and muscle mass. Females after menarche have an additional requirement for iron.
- Calcium during periods of growth spurt and increasing bone mineral content. The recommended dietary intake for calcium is 1300 mg/day.

- Counsel the adolescent and parent or caregiver on a healthy diet (Counselling box 7).

Counselling box 6. Infant formula feeding

Infant formula feeding

DO NOT use homemade infant formula. It may contain too little or too much of certain components, be at increased risk of contamination and lead to serious health problems.

DO NOT use toddler milks, drinks or formulas labelled for toddlers. They are not necessary to meet the nutritional needs of infants.

DO NOT use plant-based drinks (rice, almonds or oats, which are often wrongly labelled as "milks") and animal milks (cow, goat, sheep): these are not suitable for human babies.

Formula preparation and storage

- Wash hands before preparing bottles. Clean and sanitize the workspace and bottles.
- Follow the instructions on the infant formula container about how to prepare and store the formula correctly.
- Never use a microwave to warm the bottle.
- Use the amount of water listed in the instructions.
- Use water from a safe source to mix powdered infant formula.
- Store unopened infant formula containers in a cool, dry, indoor place to avoid spoiling: **DO NOT** store it in vehicles, garages or outdoors.
- Use prepared infant formula within 2 hours of preparation and within one hour from when feeding begins to avoid prepared infant formula from spoiling.
- If prepared infant formula is not used within 2 hours, immediately store it in the fridge and use within 24 hours.
- Throw out any leftover infant formula after feeding.

Amount and frequency of formula feeding

- Every baby is different. The amount and frequency of feeding depend on the infant's needs.
- Formula feeding should respond to the infant's needs and not be based on a predetermined schedule. Look for cues of hunger and fullness to determine both when and how much to feed.

DO NOT overfeed your baby with infant formula as this increases the risk of obesity.

Counselling box 7. Healthy diet

Healthy diet for children and adolescents

Balanced variety of foods

Eating sufficient amounts of a wide variety of healthy foods is important to grow and develop normally.

See the relative proportions of the different food groups in the following diagram to see what a balanced diet consists of:

Appropriate portion sizes and energy intake

- It is important to have regular meals.
- Portion sizes will vary depending on the age, body size and levels of physical activity. A good rule of thumb is to start with smaller servings and add as necessary if still hungry.

Plenty of vegetables and fruit

- Eat a wide variety of fresh vegetables and fruit, as they are an important source of vitamins, minerals, dietary fibre, plant protein and antioxidants.
- When preparing vegetables and fruit avoid overcooking since this can lead to loss of important vitamins.
- If choosing canned or dried vegetables and fruit make sure they do not contain added salt and sugars.

Healthy diet for children and adolescents (continued)

Opt for moderate amounts of fat and oils

- Choose unsaturated fats from sources such as fish, avocados, nuts and vegetable oils (e.g. olive, soy, sunflower or corn oil) over animal fats or oils high in saturated fats (e.g. fatty meat, butter, cheese, coconut and palm oil).
- Eat white meat (e.g. poultry) and fish in preference to red meat.
- Eat limited amounts of processed meats (high in fat and salt).
- Choose low- or reduced-fat versions of milk and dairy products, wherever possible.
- Avoid processed, baked and fried foods that contain industrially produced trans fats.

Cut down on salt and sugars

- Reduce added salt and condiments containing a lot of salt (e.g. soy and fish sauces) when cooking and preparing foods.
- Limit soft drinks and other sugary drinks such as fruit juices, syrups, flavoured milks and yogurt drinks.

Avoid unhealthy snacks

- For snacks, choose fresh fruits and raw vegetables and/or nuts instead of snacks that are high in fat, salt and sugar such as cookies, cakes, chips and chocolates.

Avoid unnecessary and unsupervised dieting

- Dieting can be dangerous: there are many types of unbalanced diets, supposedly healthy and trendy on social media, which are promoted by false experts and influencers who promise health benefits (e.g. healthy skin without acne).

Do not take unnecessary vitamin and micronutrient supplements, unless prescribed by your doctor

- If you eat a sufficiently wide variety of foods, you DO NOT need to take extra vitamins or minerals.

4.5 Micronutrient and vitamin supplements

An adequate daily intake of micronutrients, including fluoride, iron, iodine and vitamin D, is essential for physiological functioning and optimal development of the child. Iron and iodine are particularly important for brain development from the prenatal period onwards. Fluoride is essential for hardening teeth and preventing caries. Prevention and correction of specific deficiencies arising during early childhood is essential.

Children usually get adequate supplies of all micronutrients from a balanced daily diet. There is generally no need for routine multivitamin supplementation, except for children in some specific age groups (see vitamin D and vitamin K below) or children at risk of developing deficiencies due to specific circumstances and risk factors.

Universal screening for micronutrient or vitamin deficiencies is not recommended, but early identification of children with risk factors and those who already have a micronutrient deficiency is important.

Vitamin K

All newborns should receive vitamin K prophylaxis after birth to prevent haemorrhagic disease of the newborn or vitamin K-deficiency bleeding. For dosages see Annex 4.

Vitamin D

All infants should receive a daily dose of 400 international units (IU) vitamin D for at least the first 12 months of life to improve bone health and prevent rickets. Vitamin D supplementation should be started shortly after birth, regardless of the mode of feeding.

Beyond 12 months of age vitamin D supplementation is recommended for children with risk factors for vitamin D deficiency including:

- Maternal vitamin D deficiency: mothers with restricted sun exposure, dark skin colour, wearing clothes that cover most of the skin, low intake of foods containing vitamin D
- Children who were preterm babies or small for gestational age
- Children with limited vitamin D intake: prolonged exclusive breastfeeding without vitamin D supplementation, low intake of foods containing vitamin D

- Children with chronic medical conditions causing intestinal malabsorption: small bowel disorders (e.g. coeliac disease), pancreatic insufficiency (e.g. cystic fibrosis), biliary obstruction (e.g. biliary atresia)
- Children with reduced synthesis or increased breakdown of vitamin D: chronic liver or renal diseases, treatment with rifampicin, isoniazid and anticonvulsants.

DO NOT give higher doses than the recommended 400 IU as these provide no added benefit and are associated with toxicity.

Iron

Check for risk factors for iron-deficiency anaemia and for clinical signs of anaemia (p. 406). Risk factors include:

- Preterm birth or low birth weight, multiple pregnancies
- Nutritional risk factors: insufficient or restricted vegetarian or vegan diet (vegans are also at risk of vitamin B12 deficiency, see below); exclusive breastfeeding after 6 months or excessive cow's milk consumption
- Poor socioeconomic or refugee status
- Rarely due to malabsorption or GI bleeding
- Chronic medical problems
- Adolescent females (menstruation).

▶ See p. 409. for diagnosis and treatment of iron-deficiency anaemia.

Vitamin B12

Vitamin B12 is crucial to normal brain and nervous system function and to red blood cell maturation. The main source of vitamin B12 is the consumption of animal-sourced foods including meat, fish, milk and eggs.

Risk factors for vitamin B12 deficiencies:

- Vegan diets without supplementation (also risk of iron deficiency, see above)
- Malabsorption due to *Helicobacter pylori*, or to bacterial overgrowth
- Genetic disorder of vitamin B12 metabolism.

▶ Counsel on the need for oral vitamin B12 supplementation, if parents insist on keeping their infants or children on a vegan diet.

▶ In the event of malabsorption, consider IM vitamin B12 supplementation.

Fluoride

Fluoride reduces the prevalence of dental caries. There are different ways to achieve adequate fluoride intake:

- Water fluoridation: implemented in many countries.
- Fluoride toothpaste: children should brush their teeth with toothpaste with fluoride twice a day (p. 101).
- Oral fluoride supplementation.

▶ Be aware what kind of supplementation is offered in your country and follow national recommendations to avoid overdosage of fluoride.

Sodium

The body needs sodium for normal muscle and nerve function, but sodium intake is often too high and should be reduced to control blood pressure. The main sources of sodium are table salt and processed foods, which should be avoided or reduced in children's and everyone's diets.

Iodine

Iodine is essential for the child's growth and thyroid function. Iodine deficiency may be caused by inadequate intake of iodine and lead to hypothyroidism, cretinism and goitre. An important source of iodine is iodized salt, which is however not mandatory everywhere.

▶ Ensure that the child's diet contains enough iodine which is through iodized salt, fish and dairy products (e.g. milk, yogurt and cheese).

Zinc

Zinc is an important micronutrient for a child's overall health and development but is lost in greater quantities during diarrhoea.

Risk factors for zinc deficiency:

- Low intakes of animal products
- High phytate intakes
- Malabsorption and infection with intestinal parasites, especially persistent diarrhoea (p. 288)
- Genetic disorders.

In areas where the prevalence of zinc deficiency or of malnutrition is high, zinc may be of benefit in children aged ≥ 6 months. Replacement helps

the child's recovery, reduces the duration and severity of the episode, and lowers the incidence of diarrhoea in the following 2–3 months.

Zinc supplementation is not recommended in children less than 6 months of age, well-nourished children or in settings with low risk of zinc deficiency.

4.6 Oral health

Children and adolescents should visit the dentist 6–12 monthly for a preventative check-up visit, depending on the child's individual needs, risk status or susceptibility to caries and periodontal disease. Children with complex care needs may require an individualized preventive and treatment approach according to their specific disability.

- Monitor and assess the dental status by regular physical examinations at all well-child visits.

History

Assess the following factors:

- Feeding practices, nutrition, use of fluoride toothpaste and dental hygiene practices.
- Oral habits, e.g. thumb sucking and pacifier habits, bruxism (grinding, gnashing or clenching of teeth), tongue thrust (tongue presses forward too far in the mouth), self-injuring.
- Risk factors:
  - Frequent sugar exposure, free sugars in foods and drinks
  - Frequent snacking of caries-related foods
  - Inappropriate formula feeding, free sugars added to infant formula milk
  - Inadequate preventive measures, e.g. failure to use fluoride toothpastes, physical or mental impairment preventing correct tooth-brushing
  - Lack of parental knowledge about oral health
  - Dry mouth or decreased saliva production.
  - Anatomical alterations of the oral cavity including the mucosa, e.g. cleft palate, use of orthodontic appliances, gingival overgrowth
  - Diseases that entail a high risk during dental treatment, e.g. heart disease, immunosuppression, haemophilia
  - History of previous caries.

Examination

Check the dental status:

- Craniofacial growth
- Dental eruption and growth including dental occlusion, alignment between teeth and between upper and lower jaw
- Other oral pathologies (e.g. of the oral mucosa).

▶ Counsel the child and parent or caregiver on oral health and prevention of caries adapted to your context (Counselling box 8).

— Find out whether drinking water in your country contains fluoride.

— Toothpaste should contain between 500 and 1500 ppm fluoride depending on age and circumstances.

Counselling box 8. Caries prevention

Caries prevention

- Brush your child's teeth from the eruption of the first tooth, at least twice a day, including before going to bed.
- Let your child brush their own teeth as soon as they take an interest but brush them afterwards to make sure they are clean.
- As your child grows older, he or she will be able to take on the responsibility for tooth-brushing.
- The amount of toothpaste should be a smear until age 3 years, then pea-sized.
- An adequate amount of fluoride is important for healthy teeth, but too much can lead to discoloration, spots or white streaks on the teeth.

To ensure adequate fluoride intake you should use toothpaste containing ..... ppm fluoride.

Use an additional gel ..... per week.[a]

DO NOT give your child foods and drinks containing too much sugar.

[a] Fill in according to child's age and circumstances or cross out if not required.

— The use of topical fluorides such as gels and varnishes are effective in preventing dental caries and mainly recommended to children at a high risk of dental caries.

— Additional fluoride supplementation is not recommended.

4.7 Sleep

Sleep is an important part of life and the daily routine. Quality sleep – and getting enough of it at the right times – is as essential to survival as food and water. Without sleep the brain cannot learn and create new memories.

▶ Counsel caregivers, children and adolescents on the amount of sleep needed in a 24-hour period (Table 21) and how to make sure sure the child or adolescent gets enough good quality sleep.

Table 21. Sleep requirements for healthy growth and development

Infants < 1 year[a]		
0–3 months	14–17 hours	Includes naps: the baby will take a few weeks to settle into a rhythm of sleeping and being awake. Waking up at least once a night is normal.
4–11 months	12–16 hours	
Children under 5 years		
1–2 years	11–14 hours	May include a nap, with consistent sleep and wake-up times.
3–4 years	10–13 hours	
Children and adolescents 5–17 years		
5–13 years	9–11 hours	Uninterrupted sleep with consistent sleep and wake-up times
14–17 years	8–10 hours	

[a] Remember to counsel parents of newborns on preventing sudden infant death syndrome (p. 123).

4.8 Sedentary behaviour and recreational screen time

Sedentary behaviour and screen time are closely linked to the health of children and adolescents. Excessive recreational screen time (p. 653) and sedentary behaviour have negative health consequences, which are sometimes already apparent in preschoolers.

- Counsel on the need to limit recreational screen time (watching TV or videos, playing computer games) and sedentary behaviour in any 24-hour period (Table 22).

Table 22. Maximum sedentary behaviour and recreational screen time by age

Age	Sedentary behaviour	Screen time
< 1 year	**DO NOT** restrain for > 1 hour at a time, (e.g. in prams or strollers, high chairs, or on a caregiver's back) or allow to sit for extended periods of time	No screen time
1 to 2 years	When sedentary, engage the child in reading and storytelling. **DO NOT** restrain for > 1 hour at any one time (e.g. in prams, on a caregiver's back).	No screen time
3 to 4 years	**DO NOT** restrain for > 1 hour at any one time	No more than 1 hour (> 2 years)
5 to 17 years	Break up long periods of sitting as often as possible.	Limit recreational screen time to no more than 2 hours

4.9 Physical activity

Physical activity is important to improve cardiorespiratory and muscular fitness, bone and metabolic health, and to reduce the risk of noncommunicable diseases and obesity.

- Counsel caregivers, children and adolescents on the need for physical activity in any 24-hour period (Table 23).

Table 23. Physical activity by age

Age	Physical activity
< 1 year	Various physical activities several times a day, interactive floor-based play, at least 30 minutes throughout the day in prone position (on tummy) when not yet mobile.
1 to 2 years	Various physical activities of at least 180 minutes throughout the day at any intensity, including moderate-to-vigorous physical activity.[a]
3 to 4 years	At least 180 minutes throughout the day, at least 60 minutes of various kinds of moderate-to-vigorous physical activity.[a]
5 to 17 years	At least 60 minutes of various kinds of moderate-to-vigorous physical activity.[a] Vigorous-intensity activities, including those that strengthen muscle and bone, at least 3 times per week. Physical activity can include play, games, sports, transportation (walking or biking to and from school), chores, recreation, physical education or planned exercise at school, during extracurricular activities or in the family setting.

[a] Moderate-to-vigorous physical activity = activities and active play during which the child gets hot and breathless. This may take many forms and involve other children, caregivers and objects, e.g. brisk walking, cycling, running playing ball games, swimming, dancing.

4.10 Sun protection

Children require special sun protection. Children are in a dynamic state of growth and are more susceptible to environmental threats than adults since sun exposure during childhood and adolescence appears to set the stage for the development of both melanoma and non-melanoma skin cancers in later life. A significant part of a person's lifetime exposure occurs before age 18, and children have a life ahead of them to develop diseases with long latency.

Since most sun damage occurs in childhood children need to be protected from direct sunlight.

- Counsel caregivers, children and adolescents on sun protection and the health risks of UV radiation (Counselling box 9).

Counselling box 9. Sun protection

Sun protection

Sun exposure during childhood and adolescence sets the stage for the development of skin cancers in later life.

- **Limit time in the sun when it is strongest:** the sun's UV rays are usually strongest for a few hours around noon and less strong during the early morning and the late afternoon/evening. As far as possible, limit exposure to the sun during these hours.
- **Watch for the UV index:** take special care to adopt sun safety practices when the UV index predicts moderate or high levels of exposure.
- **Use shade wisely:** seek shade when UV rays are at their most intense, but keep in mind that shady structures such as trees, umbrellas or canopies do not offer complete sun protection. Remember the shadow rule: "Watch your shadow – Short shadow, seek shade!"
- **Dress your child in protective clothing:** a hat with a wide brim for protection of the eyes, ears, face and back of neck. Sunglasses that provide 99 to 100 percent UV-A and UV-B protection and tightly woven, loose-fitting clothing that covers arms and legs.

- **Apply sunscreen:** apply a broad-spectrum, very high sun protection factor (SPF) sunscreen liberally and re-apply every two hours, or after swimming, playing or exercising outdoors.
- **Adolescents should avoid sunlamps and tanning parlours:** sunbeds damage the skin and unprotected eyes and are best avoided entirely.

4.11 Unintentional injury prevention

The main causes of unintentional injuries are road traffic injuries, drowning, poisoning, thermal injuries and falls. Injuries are among the leading causes of death and long-term disabilities in children and adolescents. Deaths due to unintentional injuries are preventable.

Road traffic injuries

Road traffic injuries are the leading cause of fatal injuries in children; they are also responsible for brain and limb injuries that can result in long-term disabilities. Children need special consideration because they are vulnerable and inexperienced road users, especially as pedestrians and cyclists.

- Counsel the parent or caregiver and child or adolescent how to reduce the risk of road traffic injuries (Counselling box 10).

Counselling box 10. Prevention of road traffic injuries

Prevention of road traffic injuries

- Ensure that your child wears a helmet as a cyclist or motorcycle passenger.
- Ensure that your child wears a seatbelt and proper child-restraint system when travelling in cars, even on short trips.
- A range of restraints is available for protection such as infant car seats, child car seats, booster seats and seat belts. Their use depends on the age, weight and height of the child. Only their appropriate use can ensure good protection.

- Improve the visibility of your child on the road. Ensure that your child uses:
  - White- or light-coloured clothing or reflective materials, e.g. reflective strips attached to clothing and backpack
  - Headlamps on bicycles and front, rear and wheel reflectors.
- Supervise your child when playing.
- Help your child to evaluate risk situations on roads. Teach them how to navigate safely through risky traffic situations, e.g. safe walking, biking and road-crossing. Explain the meaning of signals and signs.

Drowning

Children are specifically vulnerable to drowning with high fatality rates, which makes prevention measures vital. Drowning can happen wherever there is water: in large bodies of water such as pools, ponds and the sea but also in buckets and bathtubs.

- Counsel the parent or caregiver how to prevent drowning (Counselling box 11).

Counselling box 11. Prevention of drowning

Prevention of drowning

- Teach your child at least basic swimming (floating, moving through water) and water safety skills as early as possible.
- Make sure children wear life jackets and personal flotation devices in and around lakes or the ocean, even if they know how to swim. Do not leave children unsupervised, even if they are wearing life jackets and personal flotation devices.

- Let your child only swim in designated areas with a lifeguard present.
- Install four-sided isolation pool fencing with self-closing and latching gates around swimming pools. Pool fences should separate the house and play area from the pool.
- Closely supervise your child at all times in or near water (including bathtubs). Avoid getting distracted by other activities: drowning can happen fast and quietly.
- Learn basic first-aid skills in order to perform immediate cardiopulmonary resuscitation to drowning children.
- Make your child aware of the danger of drowning as early as possible.

DO NOT leave children unsupervised around bodies of water.

Poisoning

Poisoning refers to an injury sustained due to exposure to a toxic substance by ingestion, inhalation, injection or absorption. Most cases of fatal poisoning are caused by pharmaceuticals, household products (e.g. bleach, disinfectants, detergents, cleaning agents, cosmetics, vinegar), pesticides and poisonous plants. The home is the most common setting for childhood poisoning and children are particularly at risk when harmful substances are stored within their reach and in non-childproof containers.

- Counsel the parent or caregiver how to prevent poisoning (Counselling box 12).

Counselling box 12. Prevention of poisoning

Prevention of poisoning

- Teach children to avoid poisonous substances
- Modify the environment to limit access to poisons
- Remove medicines and other toxic substances out of your child's reach and lock the substances away
- Remove toxic substances that are easily mistaken for edible items
- Clearly label toxic products
- Use child-resistant packaging for medicines and household chemicals.

DO NOT store medicines in unsafe places such as handbags, refrigerators and bathroom shelves

DO NOT store chemicals in inappropriate containers such as drinking bottles, since there is a risk that children may drink the contents by mistake.

Falls

Falls occur frequently and children are especially vulnerable. While most are not serious, some can cause serious injury, disability and even fatal outcomes. In young children, falls are a common cause of fatal and serious head injuries.

- Counsel the parents or caregivers how to prevent falls (Counselling box 13).

Counselling box 13. Prevention of falls

Prevention of falls

- Provide adequate adult supervision in unsafe environments

Infants and young children

- Modify or replace unsafe objects (strollers, baby walkers, high chairs, changing tables, baby exercisers). This includes replacing changing tables with changing mats, reducing the height and use of guard rails on bunk beds.
- Modifying unsafe environments in the home. Install safety equipment such as window bars, stair gates, balcony guards that cannot be climbed and safety glass in windows.

DO NOT use hazard-prone products such as baby walkers.

Older children

- Ensure your child wears a helmet and wrist- and mouthguards during activities such as biking, inline skating, skateboarding.

Burns and scalds (thermal injuries)

Thermal injuries to the skin and other organic tissue include burns (from contact with hot solids) and scalds (from contact with hot liquids). Fires are a leading cause of death in children, while contact burns and scalds can cause considerable disfigurement and long-term disability. Children under 5 years of age are at the highest risk for burns, most of which occur in the kitchen, through contact with hot liquids or oils or unsafe ovens.

- Counsel the parent or caregiver how to prevent burns and scalds (Counselling box 14).

Counselling box 14. Prevention of burns and scalds

Prevention of burns and scalds

- Use safe ovens (i.e. raised cooking surfaces) and safe cooking utensils
- Use child-safe lighters
- Make sure your child's clothes are not made of flammable materials
- Check and modify potential hazards in the home
- Install working smoke detectors
- Supervise your child
- Regulate the water-heater temperature.

DO NOT smoke in bed.

DO NOT wear long, loose-fitting clothing while cooking.

DO NOT use high set temperatures in water heaters.

4.12 Promoting mental health and well-being

Supporting the mental health and well-being of children and adolescents is a key part of keeping them safe, helping them develop and ensuring they have positive outcomes into adulthood. Fluctuations in mood and behaviour are normal, especially during adolescence (p. 526).

- Counsel all children, adolescents and caregivers on ways to maintain or improve the child's or adolescent's mental health and well-being. See Counselling box 15 for counselling messages for children and adolescents and Counselling box 16 for counselling messages for parents and caregivers.
- **Note:** The following advice should be provided to everyone – even if no emotional or behavioural problems (e.g. depression or anxiety) are suspected.

Counselling box 15. What children and adolescents can do for their mental health and well-being

What children and adolescents can do for their mental health and well-being

- Continue (or restart) pleasurable and social activities.
- Follow routines in the morning and at bedtime.
- Get enough sleep: adopt regular sleep habits and remove TV or other electronic devices with screens from the sleeping area or bedroom.
- Schedule the day with regular times for eating, playing, learning and sleeping.
- Eat regularly: children and adolescents need three meals (breakfast, midday and evening) and some snacks every day.
- Be physically active: children and adolescents aged 5–17 should engage in physical activity every day for at least 60 minutes through daily activities, playing or sports.
- Participate in school, community and other social activities as much as possible.
- Spend time with trusted friends and family.
- Avoid the use of drugs, alcohol and nicotine.

Counselling box 16. What caregivers can do for their child's mental health and well-being

What caregivers can do for their child's mental health and well-being

- Spend time with your child or adolescent in enjoyable activities.
- Give loving attention, including playing and conversing with your child daily.
- Encourage age-appropriate play (e.g. sports, drawing) and offer practical support (e.g. with homework or other skills).
- Listen to your child and show understanding and respect.
- Protect your child from any form of maltreatment, including bullying and exposure to violence in the home, at school and in the community.
- Anticipate major life changes (such as the birth of a sibling, starting school, puberty) and provide support.

DO NOT use threats or physical punishment, which may harm your relationship with your child.

- Put off serious discussions with your child until you and your child are calm: avoid blunt criticism, yelling and name-calling.
- Be consistent about what your child is allowed and not allowed to do.
- Praise or reward your child when they display good behaviour.

CHAPTER 5

Newborn health

This chapter covers **conditions specific to the newborn period**. All other conditions that may occur in the newborn period and childhood are covered in Chapters 6 and 7 of this book.

5.1 Care and physical examination of the newborn after birth

All newborns should be examined and assessed within 24–72 hours of birth (p. 24), once between days 7 and 14 after birth (p. 28) and again around 4–6 weeks after birth (p. 30). In the event of early discharge from hospital or if the infant is born at home, the first postnatal contact should be as early as possible within the first 24 hours of birth. See special considerations for home delivery (p. 121). Home visits in the first week after birth are recommended for the care of the mother and newborn.

These postnatal encounters provide an opportunity to support and reassure parents or caregivers during the newborn period; they also allow the identification of any medical condition that may impact the newborn's health if not treated and dealt with promptly, e.g. infections, hypoglycaemia or jaundice or socioeconomic circumstances that may benefit from multidisciplinary support or intervention.

Remember to congratulate the parents. You are part of an important moment of their life.

At each postnatal contact:

- Review the baby's history (family, maternal, antenatal and perinatal history) and ask if the parents or caregivers have any concerns (p. 115).
- Examine the newborn (p. 116).
- If there are no problems found, reassure the caregivers that their baby is healthy. If there are minor features, which are of no clinical importance, reassure caregivers that there is no reason to be anxious.
- If there are findings, discuss the implications with the caregiver, document them and initiate appropriate action.
- Provide immunization according to national guidelines, based on WHO recommendations (p. 69). Check and document immunization in the home-based record or immunization pass.
- Counsel the caregivers and address any concerns they may have.
- Ensure that all newborns receive vitamin K and vitamin D after birth:

Vitamin K

— 1 mg vitamin K IM within the first hour of birth (during initial breast-feeding while the infant is in skin-to-skin contact with the mother) **or**

— 3 doses of 2 mg vitamin K orally: at birth, at 4 to 6 days, and at 4 to 6 weeks.

— Preterm newborns should receive a lower dose 0.4 mg/kg IM.

Vitamin D

— Daily dose of 400 IU vitamin D starting within days after birth for at least the first 12 months of life.

History

Take a thorough medical history including:

- **Baby's progress since birth:** any parental concerns, feeding, problems in passing urine (usually within 24 hours of birth) and meconium (usually within 48 hours of birth) (p. 150).
- **Maternal history:** age, social background, chronic maternal diseases, medical treatments and drugs, recreational drugs including alcohol and smoking.
- **Family history:** father's age, genetic conditions, consanguinity of parents, previous pregnancies and health of siblings.
- **Present pregnancy:** medical conditions that may have influenced the pregnancy (e.g. gestational diabetes), complications, screening tests and special diagnostic procedures, exposure to maternal infectious diseases such as hepatitis B (p. 168), HIV (p. 167), cytomegalovirus (p. 163), syphilis (p. 164) or toxoplasmosis (p. 165) during pregnancy or delivery.
- **Labour and delivery:** mode of delivery, length of labour, signs of fetal distress, drugs and/or anaesthesia given, APGAR score (p. 24).
- **Risk factors for neonatal infections:**
  - — Premature rupture of membranes (> 18 h before delivery)
  - — Maternal fever > 38 °C before delivery or during labour
  - — Foul-smelling or purulent (chorioamnionitis) amniotic fluid
  - — Maternal colonization with Group B streptococcus
  - — Preterm delivery.

Physical examination

- Wash your hands before the examination (p. 776).
- Fully undress the newborn to the nappy and examine in a warm and well-lit environment (Table 24). Be flexible in the approach and leave the more unsettling procedures to the end of the examination. Take advantage of moments when the baby is calm to auscultate the heart.

Table 24. Components of a physical examination of the newborn

Skin
• Inspect skin: pallor, jaundice (p. 148), texture, birthmarks (pp. 146–148), skin peeling (p. 143), rashes (p. 145) or hint of injuries, e.g. bruises?
Head, face and neck
• Inspect and palpate head and sutures: signs of trauma, bleeding, swelling, moulding (p. 128), bulging or sunken fontanelle (p. 128)? • Observe facial appearance and symmetry: facial asymmetry (p. 128)? • Inspect eyes and note size, dimensions and slant: squint (p. 131), signs of infection (p. 132), ptosis (p. 134), coloboma (p. 133), enlarged eye (p. 133)? • Perform red reflex examination of the eye: absent red reflex, corneal or lens opacity (p. 119)? • Assess size and shape of ears: ear deformities, preauricular skin lesions (p. 131)? • Palpate neck and clavicles: cysts, neck mass, fracture (p. 130)? • Inspect mouth and palpate the palate: cleft palate, cysts on the roof or floor of the mouth, oral thrush, tongue tie (p. 129)?
Respiration
• Count the number of respirations during 60 seconds (normal: 30 to < 60 respirations/min). • Inspect for cyanosis and signs of respiratory distress: use of accessory muscles, chest indrawing, nasal flaring? • Listen for stridor and auscultate lungs for absent or abnormal breath sounds. • Measure oxygen saturation once to screen for congenital heart disease (p. 159) and if you notice signs of respiratory distress.

Cardiovascular system

- Auscultate the heart: tachycardia, arrhythmia, murmurs (p. 325)?
- Palpate the brachial and femoral pulses.

Abdomen

- Observe shape, symmetry, distention and inspect umbilical cord stump: infection, umbilical hernia (p. 134), umbilical granuloma (p. 135)?
- Palpate for organomegaly. The liver is usually palpable up to 2 cm and the spleen tip up to 1 cm below the costal margin. Palpate bimanually kidneys in the flank area.

External genitalia and anus

- Inspect the anus: imperforate anus (p. 138), anterior displacement of the anus (p. 137)?
- Inspect boys' genitalia: foreskin, position of urethra opening (hypospadias p. 137), swollen genitalia (p. 136), hardness (congenital torsion), undescended testicles (p. 137), hydrocele (p. 137) or asymmetry?
- Inspect girls' genitalia: hypertrophy of clitoris, swollen genitalia, vaginal discharge, imperforate hymen (p. 137)?

Musculoskeletal

- Check head, face, neck, limbs and trunk for signs of birth injuries: fractures, paralysis, asymmetry, bruises, swelling, decreased movement, pain on palpation and movement?
- Inspect spine and coccyx area, palpate bony structures and note integrity of the skin: sacral dimple, neural tube defect (p. 138)?
- Inspect upper and lower limbs: asymmetric movements, palmar and plantar creases, extra digits (p. 139) and talipes (p. 140)?
- Assess the symmetry of the limbs and skin folds and perform Barlow and Ortolani manoeuvres (p. 142): congenital hip dysplasia (p. 141)?

Vital signs

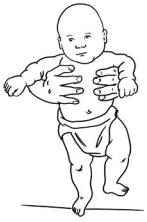
- Measure axillary temperature, heart rate (normal < 180 beats/min) respiratory rate (normal: 30 to < 60 respirations/min) and capillary refill time (normal within 2 s).

Growth

- Measure weight, length and head circumference (growth monitoring p. 20). This can be postponed to the end to minimize crying.

Neurological

- Observe behaviour, movements, posture, level of alertness, muscle tone and ability to move arms and legs equally. Note the cry.
- Elicit newborn reflexes (see illustrations).



Stepping reflex: the baby appears to take steps or dance when held upright with their feet touching a solid surface. This reflex lasts until about 2 months.

Tonic neck reflex ("fencing" posture): when a baby's head is turned to one side, the arm on that side stretches out and the opposite arm bends up at the elbow. This reflex lasts until 5 to 7 months.

Grasp reflex: stroking the palm of a baby's hand causes the baby to close the fingers in a grasp (palmar grasp). This reflex lasts until about 5 to 6 months. A similar reflex in the toes (plantar grasp) lasts until about 9 to 12 months.

Crawling reflex: when the baby is placed on the stomach and pressure is applied to the sole of the foot, the baby will press against the hand and begin to imitate a crawling motion. This reflex lasts until 4 to 6 months.

Moro reflex: in response to sudden loss of support, the baby throws back their head, extends out their arms and legs, cries, then pulls the arms and legs back in. This reflex lasts until about 2 months.

5.2 Growth and weight monitoring

It is normal for a newborn to lose 5–10% of birth weight during the first days of life. Weight loss should not exceed 10% of the birth weight. Birth weight should be restored within 14 days.

- Monitor growth during each visit to ensure adequate weight gain (p. 20).
- If weight loss exceeds 10% of birth weight, perform a thorough physical examination and assess breastfeeding, attachment, milk intake, and maternal history, beliefs and behaviours. If there is no specific concern, support breastfeeding and follow-up in 2–3 days. If you find something of concern during your examination and/or you suspect an underlying disease, or if the baby is not improving after 2–3 days' follow-up, refer to hospital.

5.3 Screening tests

Every newborn should be screened for congenital, genetic and metabolic diseases, hearing and visual problems and hip dysplasia.

Hearing screening

- Perform otoacoustic emission (OAE) or automated auditory brainstem responses (AABR) hearing screening in all newborns before 1 month of age, if not completed in hospital prior to discharge or if the newborn was delivered at home.
- Refer all newborns with abnormal hearing screening to an audiologist before 3 months of age.

Vision screening

- Perform a red reflex examination in all newborns using a pen light to look for a reflection of red light from the retina.
- Refer all newborns without a red reflex to a specialist, as this may indicate congenital cataract (p. 459) or leukocoria in early retinoblastoma (p. 459).

Newborn screening for metabolic and endocrine diseases

Many metabolic and endocrine diseases can be detected using a few drops of blood obtained by heel prick or venepuncture. Blood for newborn screening should be taken 48 to 72 hours after birth. Countries have different screening guidelines, but in general newborns should be screened for the following diseases:

- Phenylketonuria
- Congenital hypothyroidism (p. 161)
- Galactosaemia
- Cystic fibrosis (p. 598)
- Haemoglobinopathies: sickle cell disease (p. 614), thalassaemia (p. 612)
- Congenital adrenal hyperplasia.

Screening for hyperbilirubinaemia

- Assess for jaundice and risk factors of hyperbilirubinaemia.

▶ If the baby is jaundiced or has risk factors, measure bilirubin levels with a transcutaneous bilirubinometer (p. 792) or serum bilirubin, especially in the first 72 hours of life. To assess if the jaundice is normal and risk factors, bilirubin thresholds of pathological jaundice and subsequent management, see p. 148.

Oxygen saturation

- Perform pulse oximetry to measure oxygen saturation (SpO_2) for diagnosis of cyanotic congenital heart defects (p. 159). The screening test is abnormal if:
  - $SpO_2 < 90\%$ in either extremity **or**
  - $SpO_2 < 95\%$ in right hand and foot on 3 measures each 1 hour apart **or**
  - > 3% difference between right hand and foot on 3 measures each one hour apart.

▶ If abnormal: give oxygen if $SpO_2 \leq 90\%$, treat other causes of hypoxaemia (e.g. sepsis). Refer urgently to hospital.

Assessment for congenital hip dysplasia

- Examine to check whether the infant's legs and buttocks are symmetrical, including the Barlow and Ortolani manoeuvres (p. 142) before 1 month of age.

▶ If any concerns, refer to a specialist for ultrasound.

5.4 Additional considerations in case of home delivery

If the baby was delivered at home, in addition to taking a general history and performing an examination and screening tests, provide routine immunization (p. 27) and vitamin K (p. 115).

Additional history during a first visit of a newborn born at home

- Assess for risk factors of:
  - — **Neonatal infection** (p. 115).
  - — **Hypoxic-ischaemic encephalopathy** (birth asphyxia): very young or old mother, multiple births, low birth weight, umbilical cord problems, placental abruption, meconium-stained liquor, prolonged labour, shoulder dystocia.
  - — **Hypoglycaemia:** maternal diabetes, asphyxia, intrauterine growth retardation, small or large for gestational age.

▶ If any risk factor for neonatal infection is present and the mother did not receive antibiotics during labour, refer urgently to hospital.

▶ If any risk factor is present, measure glucose (see below).

Additional examination during the first visit of a newborn born at home

- Measure and register birth weight (p. 20).
- Look for major congenital problems including cleft lip and palate (p. 129), bowel obstruction, neural tube defects (p. 138) and abdominal wall defects such as omphalocele.
- Look for signs of birth asphyxia: poor tone, poor cry, poor sucking, lethargy, decreased level of consciousness, decreased movements and reflexes, seizures.

▶ If any major congenital problems, refer urgently to hospital.

▶ If any signs of birth asphxia: refer immediately to hospital.

▶ In the event of seizures, give phenobarbital (p. 836) treatment prior to referral.

Glucose screening

- Measure glucose in all newborns with risk factors for hypoglycaemia (see above). If hypoglycaemia (glucose < 2.5 mmol/L or < 45 mg/dL) is identified and persists after feeding, refer the newborn promptly to hospital for evaluation and treatment.

5.5 Counselling during the newborn period

The newborn period is crucial for the child's health and a sensitive period for families, especially mothers. Provide counselling, praise and support for the parents or caregivers and the family in general.

Family planning

- Counsel parents about adequate child spacing of at least 2 years between children.
- Talk to parents about the need for responsive caregiving, learning experiences for their children and financial resources as external factors to consider when planning how many children to have.

Emotional well-being of the parents or caregivers

- Ask caregivers at each postnatal visit about their emotional well-being, available family and social support and their coping strategies for dealing with day-to-day challenges.
- Identify fears or concerns linked to the baby's care, the baby's normal development or reactions.
- Identify potential mental health problems in the family.

Empowerment of the parents or caregivers

- Offer relevant and timely information to enable caregivers to promote the health and well-being of the entire family and to recognize and respond to problems.
- Ensure that caregivers know how to assess their baby's general condition, how to identify danger signs and when to contact a health care professional or emergency services. Danger signs include:
  - Not feeding well
  - Convulsions
  - Drowsiness or unconsciousness
  - Fast breathing or difficulty in breathing.

Breastfeeding

- Encourage mothers to breastfeed their newborns. At each visit let them show you how they breastfeed (p. 84).
- Assess the breastfeeding technique, including observation of position, attachment and whether the baby takes in enough breast milk (p. 85).

Kangaroo mother care

- Low-birth-weight newborns (< 2 kg) who are clinically stable should be given kangaroo mother care (KMC) starting immediately after birth for as many hours as possible. Full-term newborns also benefit from it.
- Counsel the caregivers on how to provide KMC (Counselling box 17).

Counselling box 17. Kangaroo mother care

Kangaroo mother care is beneficial for your baby's development

Kangaroo mother care

- Dress your baby only in a nappy, hat and socks. Aim for a core body temperature of 36–37 °C, with the feet warm and pink.
- Place your baby in skin-to-skin contact on your chest between the breasts, with your child's head turned to one side.
- Tie the baby to your body with a cloth and cover yourself and your baby with your clothes.
- Breastfeed your child frequently.
- While fathers obviously cannot breastfeed their newborns, they can provide excellent kangaroo care.

Newborn sleep

In the first 3 months of life, babies sleep 14–17 hours per day with significant variations. This reduces, on average, to 12–16 hours per day at age 6–12 months. The baby will take a few weeks to settle into a rhythm of sleeping and being awake. They are likely to wake up at least once a night until the first year of life. From early on, babies develop different ways to settle themselves to sleep.

Sudden infant death syndrome prevention

Sudden infant death syndrome (SIDS) is the sudden and unexpected death of an infant under 1 year of age during sleep, which remains unexplained after a thorough investigation including an autopsy. SIDS is a major cause of death in infants beyond the neonatal period in many countries.

- Counsel the parent or caregiver how to prevent SIDS (Counselling box 18).

Counselling box 18. How to prevent sudden infant death

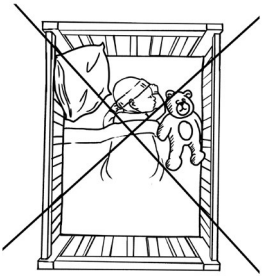
How to keep your baby safe during sleep

DO

- Place your child to sleep on his or her back on a firm sleeping surface.
- Create a safe sleep environment: your child should sleep in his or her own cot in your bedroom.
- Leave your child's head uncovered and ideally let him or her sleep in a sleeping bag.
- Exclusively breastfeed your baby for six months.
- Keep your child free from smoke.

DO NOT

- Do not let your baby sleep on the tummy.
- Do not let your baby sleep in the same bed with others.
- Do not overheat the room.
- Do not cover the baby's head while sleeping indoors.
- Do not let your baby sleep on a soft mattress.
- Do not put other items in the bed (teddies, pillows, soft objects and loose bedding).
- Do not let anyone smoke around your baby.
- Do not smoke while you breastfeed.



Care of the newborn skin, nails and bathing

▶ Counsel the parent or caregiver how to provide care for their baby's skin, nails and bathing (Counselling box 19).

Counselling box 19. Care of the newborn skin, nails and bathing

How to care for your babies' nails, skin and umbilical cord

Fingernails

Newborn fingernails and toenails are soft and flexible:

- Use a nail file, baby nail clippers or scissors that have blunt rounded tips to trim the nails if they are ragged or too long.

Nappy care

The skin under the nappy often gets irritated and red because of moisture and contact with stool and urine:

- Regularly change the nappy and clean with cotton balls or towels with warm water.
- If you see signs of nappy rash apply a barrier cream at every nappy change, change the nappy more frequently and remove it for as long as possible to keep the area dry.
- If your baby's nappy rash persists for 3 days or more despite good care, it may be due to a fungus (candida) and need antifungal treatment. Consult your doctor for appropriate treatment.

Umbilical cord care

- Keep the umbilical cord and cord area clean and dry. Clean with water. Do NOT use alcohol wipes.
- Expose the umbilical stump to air: leave it uncovered by the nappy to avoid contact with urine and moisture. It falls off by 1–3 weeks.
- Check the belly button for infections.

Bathing

- Delay bathing until at least 24 hours after birth.
- Bathe for less than 5 minutes and give 1–2 baths per week.
- Warm the water to 37 °C and keep the room at a room temperature of 26–27 °C. Check the water temperature bathing.

Sun protection

- For at least 6 months keep your baby out of direct sunlight, dress them in light clothing that covers the arms and legs and use brimmed hats that shade the neck.
- Apply sunscreen with at least sun protection factor (SPF) 15.

5.6 Normal variations and concerning findings

This chapter introduces findings that range from common and normal variations to rare conditions including congenital diseases and birth injuries. These findings may be noticed during the routine postnatal examination of the newborn or by the parents or caregivers.

5.6.1 Head and skull

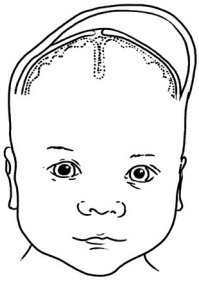
Caput succedaneum

Caput succedaneum is a relatively common finding in newborns caused by the pressure of the scalp against the birth canal during birth. It can be confused with cephalohaematoma (p. 127).

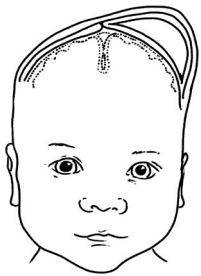
- Soft swelling (fluid collection) under the skin of the scalp and above the periosteum (see figure on next page) with poorly defined margins
- Crosses the midline
- Associated with erythema, bruising and petechiae.

▶ Reassure the caregivers. The condition usually resolves over a few days and does not require any intervention. Remind them to come back if the swelling does not dissolve within 3 days.

▶ Consider imaging if there is a large caput succedaneum that does not disappear in 48 to 72 hours or if there is increasing swelling, neurological deficit or haemodynamic instability.



Caput succedaneum: *swelling above the periosteum which crosses the midline of the suture lines*



Cephalohaematoma: *swelling below the periosteum which does not cross suture lines*

Cephalohaematoma

Cephalohaematoma is an accumulation of blood under the scalp due to the rupture of blood vessels during delivery.

- Usually appears 2–3 days after birth
- Fluctuant haematoma below the periosteum (see figure opposite)
- Limited to one cranial bone, does not cross suture lines
- A skull fracture is sometimes present (often a linear fracture).

▶ Anticipate the development of jaundice (p. 148) and check for calcification. For large haematomas, ensure the child is not anaemic and anticipate the development of jaundice.

▶ Reassure the caregivers. Cephalohaematoma may take months to resolve but usually does not require any intervention.

Subgaleal hemorrhage

Subgaleal hemorrhage is the least common but the most serious extracranial injury, caused by bleeding into the space between the skull periosteum and scalp galea aponeurosis.

- Diffuse swelling of the soft tissue
- Develops gradually 12–72 hours after delivery
- Spreads towards the neck and behind the ears
- Periorbital swelling may also be present
- On palpation, a fluctuant watery mass is felt over the scalp, mainly over the back of the head with superficial skin bruising. If a lot of blood accumulates, a visible fluid wave may be seen.

▶ If you suspect subgaleal hemorrhage, refer urgently to hospital.

Skull bruises

Most skull bruises are due to prolonged labour or minor trauma caused by instruments used in assisted delivery (forceps or vacuum extraction). Bruises may be mistaken for port-wine stain birthmarks (p. 148).

▶ Most bruises are harmless, heal easily and do not need treatment. Reassure the caregivers if a port-wine stain birthmark is ruled out.

Craniotabes

Craniotabes is a softening or thinning of the skull bones mostly affecting the back and sides of the head. May be normal especially in premature newborns. The bones collapse under pressure and when pressure is relieved, snap back into place.

- Rule out conditions affecting bone growth such as rickets (p. 425), syphilis (p. 164) or thalassaemia (p. 612).

Bulging fontanelle

A bulging fontanelle is usually caused by crying. It is soft if the child is not crying.

- Rule out increased intracranial pressure, e.g. due to meningitis (p. 235).

Moulding

Moulding is the process whereby the parietal bones overlap during the transition of the baby's head through the birth canal. This can be felt as a ridge along the suture lines.

- Reassure the caregivers. Moulding is a physiological condition that may take a few days to resolve but does not require any intervention.

5.6.2 Face

Facial bruises

Facial bruises are mainly caused by pressure during a vaginal delivery and might be mistaken for port-wine stain birthmark (p. 148).

- Reassure the caregivers. Most bruises heal easily and need no treatment.

Facial asymmetry

Compression through the birth canal may make the face initially appear asymmetrical. Very rarely facial asymmetry is caused by facial nerve damage during delivery.

- Reassure the caregivers. Recovery is usually gradual in a few weeks after birth. Advise them to return in the rare event of it failing to resolve.

5.6.3 Mouth

Tongue tie

The fold of skin under the tongue (lingual frenulum) that attaches the bottom of the tongue to the floor of the mouth is unusually short, thick or tight. The baby is usually still able to breastfeed.

- Reassure the parents that the tongue will grow normally as the baby gets older.

DO NOT routinely refer for surgery to remove the fold.

- If there is difficulty with eating because the tie is restricting the tongue's movement and the baby does not gain weight, refer the baby.

Ranula

A ranula is a fluid collection or cyst that forms on the floor of the mouth under the tongue.

- Reassure the parents. If small and asymptomatic, no treatment needed.
- If large or symptomatic, refer for minor oral surgery.

Epstein pearls

Epstein pearls are small white swellings (gingival cysts) along the roof of the mouth.

- Reassure the parents. No treatment needed.

Oral thrush (candidiasis)

Oral thrush is an infection caused by Candida albicans. It is common in the first year of life especially in breastfeeding infants.

- White spots with a red edge on the tongue, cheeks, bottom of the mouth or palate
- Treat with nystatin gel (100 000 U/mL) or miconazole gel (20 g/mL) 1 mL four times a day until a few days after the white spots have disappeared.
- Reassure the parents.

Cleft lip and palate

- Cleft lip and palate may occur together or separately (see illustration below).
- Reassure the parents that surgery can restore normal function and achieve a normal appearance with minimal scarring.

Unilateral cleft lip *Bilateral cleft lip* *With cleft palate*

Cleft lip and palate

- Refer for surgical closure. Closure of the lip can be done at 6 months and of the palate at 1 year of age. The lip may be repaired earlier if it is safe to give an anaesthetic and the repair is technically possible.
- Closely monitor feeding and growth. Babies with isolated cleft lip can feed normally, whereas cleft palate is associated with feeding difficulties.
- Provide feeding advice to the caregivers: feed with expressed breast milk from a cup and spoon or bottles; a special teat may be used. The technique of feeding is to deliver a bolus of milk over the back of the tongue into the pharynx with a spoon, pipette or some other pouring device. The baby will then swallow normally. Refer if feeding or weight gain is not satisfactory.
- Note that sleep-related upper airway obstruction can cause hypoxaemia and growth failure. If suspected, refer for specialist treatment.

5.6.4 Neck

Congenital neck mass

A congenital neck mass usually presents as a painless neck mass but may cause swallowing difficulties, respiratory distress and neck pain due to compression of surrounding structures.

- Refer for confirmation of diagnosis and surgical planning. See p. 435 for more information.

Torticollis

Torticollis is caused by a shortening on one side of muscles of the neck that causes the head to tilt.

- Babies tilt their head towards the side of the shortened muscle and rotate the head to the opposite side.
- ▶ Reassure the caregiver and counsel on how to position the baby so that it looks more towards the affected side, e.g. during breastfeeding and to position the head of the baby using towels when lying on its back to gently stretch the affected muscle.
- ▶ Review in 4–6 weeks and refer for further evaluation and physiotherapy if no improvement.

5.6.5 Ears

Congenital variations of the ear

There are many anatomical variations of the ear, including:

- Preauricular skin lesions and appendages, fleshy tags or superficial dimples, on one side or both, located just in front of the ear
- Protruding, constricted (helical rim is folded over, wrinkled or tight), underdeveloped or absent ears
- Earlobe variations (with clefts or duplicate earlobes).
- ▶ Reassure the caregivers and ensure that a hearing test is carried out: there may be an increased risk of hearing loss.

Preauricular skin lesion

5.6.6 Eyes

Newborns can see, but their vision is not focused. Their eyesight develops gradually over the first few months. At the age of 3 months, their eyes begin following faces or a colourful object held close to their face.

- ▶ If the newborn is not following movements with the eyes by age 3 months refer to an eye specialist.

Squint

A squint is normal in a newborn within the first months of life.

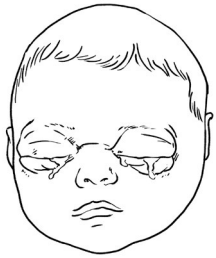
- The eyes may roll away from each other or look misaligned.
- ▶ Refer if the squint has not resolved by 3 months or if it is permanent.

Squint

Conjunctivitis (ophthalmia neonatorum)

Conjunctivitis in a newborn may be caused by a chemical irritation due to topical eye prophylaxis given at birth, or an infection with a virus or bacterium passed from the mother to her baby during childbirth.

- **Mild conjunctivitis** (sticky, red eyes and tender, swollen eyelids) is a common problem in newborns and infants.
- **Herpes virus conjunctivitis** is rare and presents with an acute onset 1–14 days after birth with discharge in one or both eyes and blisters on the skin.
- **Severe conjunctivitis** (red and sticky eyes, profuse discharge of pus and/or severe swelling and inflammation of the eyelid, surrounding cellulitis) is often due to gonococcal infection (onset of symptoms 1–5 days after birth) or *Chlamydia trachomatis* (onset of symptoms 5–14 days after birth).



Ophthalmia neonatorum: swollen red eyelids with pus

- **Conjunctivitis caused by eye prophylaxis** given at birth usually resolves within 2 to 4 days. No treatment needed.
- For **mild conjunctivitis** caused by bacteria other than *Chlamydia trachomatis* and *Neisseria gonorrhoea*: give topical antibiotics, see p. 819 for treatment.
- For **severe conjunctivitis**, suspect gonococcal or chlamydial conjunctivitis and refer immediately to hospital, as urgent treatment is required. If referral is delayed, give ceftriaxone 50 mg/kg (max. 150 mg) IM as a single dose before referral.
- If you suspect **herpes virus conjunctivitis**, refer immediately to hospital for IV aciclovir treatment.

Narrowing of the tear duct (lacrimal duct stenosis)

Occasionally babies are born with blocked tear ducts. This causes a blockage, and the tears have no place to drain.

- Swelling and redness at the side of the nose
- Watering of the eyes
- Eyes often covered by sticky, crusty secretions in the morning.

- ▶ Reassure the caregivers that the duct will open within a few months.
- ▶ Explain how to keep the eye clean with clean water and how to gently massage the outside edges of the bridge of the nose.
- ▶ If there is no improvement by the age of 1 year, refer.

Bloody sclera, bloodshot eyes (subconjunctival haemorrhage)

Bleeding into the sclera (white parts of the eye) is caused by an increased pressure on the head during the passage through the birth canal. Usually asymptomatic and will disappear within a week without any treatment.

- ▶ Reassure the caregivers.

Cloudy lens or absent red reflex

A lens opacity (grey-white clouding of the lens) or absence of the red reflex, during the red reflex examination (p. 119), can be a sign of both congenital cataract (p. 459) and early retinoblastoma (p. 459).

- ▶ Refer newborns with an absent red reflex or a cloudy lens immediately to an eye specialist. Early detection and treatment are essential.

Enlarged eye and clouding of the cornea

An enlarged eye and clouding (whitening) of the cornea may both be a sign of primary congenital glaucoma. Glaucoma results in increased pressure in the eye causing damage to the eye structures including the optic nerve, which can ultimately lead to blindness.

- ■ Usually present at birth or within the first year of life
- ■ In most cases the condition is bilateral.
- ▶ Refer immediately to an eye specialist.

Coloboma

- ■ Coloboma is a slit in one of the structures of the eye, such as the iris (in most cases), retina, choroid or optic disc. It is usually at the lower part of the eye, and a relatively uncommon congenital condition. The level of impairment can range from no visual problems to seeing only light or dark, depending on the position and extent of the lesion.
- ▶ Refer to an eye specialist for assessment.

Congenital ptosis

Congenital ptosis is the lower positioning or drooping of the upper eyelid. It is a relatively rare and harmless condition that persists without treatment. It may be associated with other eye or systemic conditions, e.g. Horner syndrome.

- Monitor the newborn closely for increasing astigmatism or amblyopia. Refer children with affected vision or at risk of amblyopia (p. 444) for prompt surgery.
- Consider surgery for functional or cosmetic reason for children with mild ptosis.

Retinopathy of prematurity

Retinopathy of prematurity is a disease of the retina with abnormal vessel proliferation, which can lead to retinal detachment, visual impairment and blindness. It mainly affects extremely preterm infants and requires early management.

- Refer all newborns with the following risk factors to an eye specialist for a screening examination and management:
  - Preterm birth (gestational age ≤ 32 weeks)
  - Birth weight ≤ 1500g
  - Ventilation or excessive oxygen administration.

5.6.7 Abdomen

Umbilical hernia

A part of the intestine protrudes through the abdominal wall around the umbilicus.

- Soft, reducible, painless swelling at the belly button
- Usually swelling increases when the infant is in distress and crying.

Hernias are harmless if they are painless and can be easily pushed back into the abdomen.

- Reassure parents that most asymptomatic hernias close spontaneously.
- Refer children over the age of 3 years to a paediatric surgeon, as spontaneous closure is less likely as the child grows older.
- If the swelling becomes painful on handling, changes colour and is irreducible, accompanied by vomiting or constipation, refer the infant immediately to rule out an incarceration of the umbilical hernia.

Umbilical granuloma

An umbilical granuloma is a small growth of tissue that forms in the belly button during the first few weeks after the umbilical cord has fallen off.

- Small, red and moist growth on the base of the umbilical stump
- Apply silver nitrate directly to the granulation tissue. The granuloma will become dark and fall off quickly. Be careful when applying the silver nitrate and protect the surrounding skin with petroleum jelly, as silver nitrate can cause burns and pain. Follow up after 2 days to assess if the application of silver nitrate needs to be repeated.
- Alternatively, apply common salt to the umbilical granuloma and counsel the parents to continue treatment at home (Counselling box 20).
- Refer if urine or stool are leaking from the umbilicus suggesting other diagnoses.

Counselling box 20. How to treat an umbilical granuloma

How to treat your baby's bellybutton if a granuloma has developed

- Clean the area around the bellybutton with a wet cotton pad.
- Apply a small pinch of table salt onto the granuloma.
- Cover the area with a small piece of gauze and hold it in place for 10–30 minutes.
- Proceed to clean the site using a clean gauze soaked in warm water.
- Repeat the procedure three times a day for at least 3 days until the granuloma reduces in size and falls off. The area will gradually heal.
- Let the granuloma dry after swabbing and keep it clean throughout the treatment.
- If it does not improve after 3 days, come back for a follow-up appointment.

5.6.8 Genitalia, anus and inguinal area

Swollen genitalia

Boys' and girls' genitals appear swollen initially but will look normal within a few weeks. It may rarely be a sign of adrenogenital syndrome.

- Reassure the caregivers that the condition is self-resolving and that no treatment is needed.
- Refer if other signs for possible adrenogenital syndrome.

Swollen breasts

Boys and girls may be born with swollen breasts, due to the influence of maternal prolactin hormones; some newborns may even produce a few drops of milk.

- Reassure the caregivers that the swelling will resolve within a few weeks without any treatment. Counsel them to avoid squeezing the breasts.
- If the breasts become red and painful, consider an infection or breast abscess. If you suspect an infection or abscess, refer for IV antibiotic treatment with *Staphylococcus aureus* coverage or incision and drainage.

Inguinal hernia

Abdominal content protrudes through the muscles of the lower abdomen in the groin area. It is more frequent in premature babies and boys.

- The swelling gets larger when the baby coughs or cries
- The swelling can completely disappear when the baby is at rest.
- Refer all newborns with inguinal hernias for evaluation and eventual surgical treatment. See p. 375 for more information.
- If the swelling becomes stuck or is painful, refer urgently.

Inguinal hernia

Vaginal discharge

Vaginal discharge is normal in newborn girls; it is caused by maternal hormones.

- Reassure the caregivers that no treatment is needed. A blood-flecked or cloudy discharge from the vagina is self-resolving.

Imperforate hymen

Girls are occasionally born without a hymenal opening and have a membrane covering the vagina.

- There may be a bulge of the hymenal membrane due to a blockage of normal mucus drainage from the vagina.
- ▶ Refer for surgery.

Hydrocele

Boys are occasionally born with an enlarged scrotum due to an accumulation of clear fluid around the testicles.

- Soft scrotum
- Swelling is not increasing during crying or coughing
- The swelling transilluminates (scrotum glows when a light source is put behind it).
- ▶ If the swelling increases during crying or coughing rule out inguinal hernia (p. 375).
- ▶ Hydroceles in boys below the age of 1 year usually resolve spontaneously within the first year of life. See p. 373 for more information.

Undescended testicles

The descent of the testicles can be delayed by a few months without causing any problems.

- One or both testicles are not in the scrotal sac. They might be palpated above the scrotum.
- ▶ Follow up and refer if both testicles are not in the scrotum by the age of 6 months. See p. 374 for more information.

Anatomical variations of the foreskin

Anatomical variations of the foreskin may range from isolated incomplete formation (a harmless finding needing no treatment) to association with other anatomical variations of the penis such as hypospadias (opening of the urethra is not located at the tip of the penis).

- ▶ Refer for surgical correction, if indicated.

Anterior displacement of the anus

Anterior displacement of the anus is a common congenital variation of the anorectal region, which more frequently affects girls.

- Anus looks normal but is displaced closer to the vagina or to the base of the scrotum
- Sometimes associated with constipation in infancy and childhood

▶ Give stool softeners or occasional glycerine suppositories to relieve straining if needed.

▶ Reassure parents that surgery is not needed when there are no other findings.

Imperforate anus

An imperforate anus is a rare congenital condition.

- Absence of the normal anal opening
- Elimination of faeces is not possible

In some cases, the rectum or colon may be connected by a fistula to the bladder or lower part of the vagina in girls and to the scrotum in boys.

▶ Refer for urgent surgical intervention.

5.6.9 Spine and lumbosacral region

Sacral dimple

A sacral dimple is an indentation in the skin on the lower back near the crease of the buttocks, which is present at birth. It is considered simple if it is smaller than 0.5 cm in diameter, located within 2.5 cm of the anus and not associated with cutaneous features (e.g. hairy areas, haemangiomas).

▶ Reassure the caregivers, if the sacral dimple is simple. If the dimple does NOT fulfil the criteria refer the newborn for further investigation.

Neural tube defects

Neural tube defects are birth defects of the brain, spine or spinal cord. Neural tube defects are often already diagnosed before the baby is born. After birth the neural tube defect is observed in the lower back or more rarely in the middle back or neck. There are three main types:

- **Spina bifida occulta:** no or only mild signs, e.g. swelling on the back, hairy areas, dimple or a dark spot.
- **Meningocele:** protrusion contains meninges and cerebrospinal fluid.
- **Myelomeningocele (spina bifida):** cystic protrusion contains spinal cord and/or nerves. This most severe form is accompanied by problems with walking and bladder or bowel control, hydrocephalus, tethered

spinal cord, i.e. the spinal cord is abnormally attached to surrounding tissue.

- ▶ Refer to specialists for further assessment and treatment. See p. 575 for more information.

5.6.10 Arms and hands

Extra fingers or thumbs (polydactyly)

Babies are sometimes born with an extra finger or thumb (or toe). The size of the extra digit may range from a small, raised bump to a complete finger.

- ■ Often smaller than the other digits, not well formed and without a bone structure.
- ▶ If the extra digit is small and contains no bone: tie a thread several times around the base of the digit. It will soon dry and fall off.
- ▶ If the extra digit is large and contains bone, refer the baby for planning of surgical removal when a few months or years old.
- ▶ Refer if there are other congenital conditions, since extra digits may be associated with several syndromes.

Erb's palsy

Erb's palsy is a paralysis of the arm caused by injury to the arm's main nerves during delivery. Risk factors include breech position, large newborn, shoulder dystocia or protruding arm during delivery.

- ■ The affected arm is limp and rotated inwards with flexed wrists
- ■ Hand function is not affected
- ■ Asymmetric Moro reflex.
- ▶ Reassure the caregivers that the paralysis usually resolves spontaneously. Advise them to handle the baby carefully and avoid any movements causing discomfort for the first 2 weeks.
- ▶ Follow up and if not resolving refer for physiotherapy.

Fractured clavicle

- ■ Visible or palpable lump over the clavicle
- ■ Pain and crepitations on palpation and passive movement
- ■ Asymmetric Moro reflex can be present.
- ▶ Reassure the caregivers that in newborn babies' bones heal quickly. A large callus may form which will later resolve.

▶ Ensure pain relief by immobilizing the arm and advise caregivers to handle the newborn carefully. No further interventions are required.

Fractured arm

- Affected arm is immobile and swollen
- Pain on palpation and passive movement
- Absent Moro reflex on the affected side.

▶ Refer to a surgeon for evaluation and management. A fractured humerus needs to be strapped to the body to immobilize it. A fractured ulna or radial bone requires casting with plaster or splint.

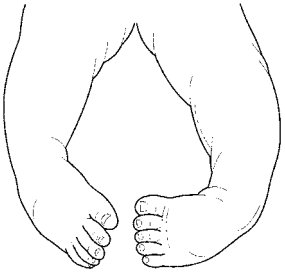
5.6.11 Legs and feet

Talipes equinovarus (club foot)

Talipes equinovarus is a common congenital condition involving the foot and lower leg.

- Foot points down- and inwards
- Foot cannot be placed in the normal position
- May affect one or both feet.

▶ Start care and management of club foot beginning as early as 1 week old. It is a long process that may last 4–5 years or longer in some cases.



Talipes

▶ Mild forms (the foot can be passively corrected): ensure simple stretching of foot beginning shortly after birth.

▶ Refer newborns with moderate or severe deformity. Treatment consists of casting (Ponseti method of serial manipulation and casting) and bracing and sometimes additional surgery.

Calcaneovalgus foot

In calcaneovalgus foot the foot points up- and outwards. In severe cases, the top of the foot touches the shinbones.

▶ Reassure the caregivers that it causes no pain and resolves on its own within the first weeks of life.

Metatarsus adductus

Metatarsus adductus is a condition in which the front part of the newborn's foot turns inward.

- ▶ Reassure the caregivers that most cases resolve without treatment. Follow up in more severe forms to ensure normal development of the foot.

Fractured leg or foot

A fractured leg or foot is rare and usually occurs during breech delivery.

- ■ Visible deformity and swelling
- ■ Affected leg is immobile
- ■ Pain during passive movement and palpation.
- ▶ Refer urgently for an orthopaedic evaluation. A fractured femur requires traction and casting. A fractured tibia or fibula requires casting with plaster or fibreglass.

Extra toes

See extra digit, p. 139.

5.6.12 Hips

Developmental dysplasia of the hip

Hip dysplasia is a condition wherein the socket of the hip bone is shallow and does not completely cover the ball on the femoral head. It often results in instability and hip displacement (the femoral head slides out of place) of the hip joint.

Developmental dysplasia of the hip should be detected and treated as early as possible. If left untreated it can cause long-term problems such as walking problems, chronic pain and degenerative arthritis.

Diagnosis

Most countries apply a targeted approach at well-baby visits including a systematic clinical examination including Barlow and Ortolani manoeuvres and an assessment of risk factors. Depending on the findings the newborn may be referred for ultrasound at 6 weeks of age.

History

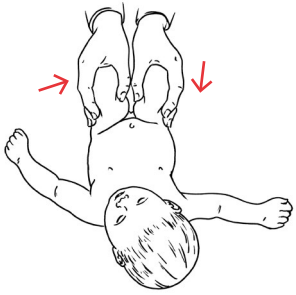
Assess for risk factors:

- Breech birth (particularly baby girls)
- Multiple pregnancies
- Family history
- Torticollis
- Foot deformities.

Examination

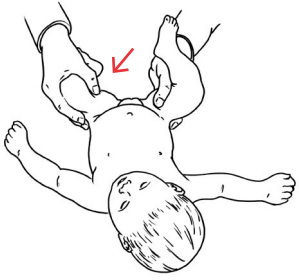
All infants should undergo a clinical examination of the hip after birth and no later than 1 month of age (see Chapter 3). During the examination:

Perform Barlow and Ortolani manoeuvres. Inspect for symmetry of the buttocks and legs: when the dysplasia is unilateral, one limb appears shorter: there is limited abduction when the hip is flexed, and the skin crease at the back of the hip appears asymmetrical.



Barlow manoeuvre

Barlow manoeuvre: hold the baby's thigh near the hip and attempt – with gentle pressure towards the back and side – to dislocate the femoral head from the socket of the joint (acetabulum). Normally, there is no motion in this direction. If the hip is dislocatable, a distinct "clunk" may be felt as the femoral head pops out of joint. The hip joint is said to be "Barlow positive", loose (unstable) or dislocatable.



Ortolani manoeuvre

Ortolani manoeuvre: hold the upper thigh and apply gentle pressure on the abducted hip to attempt to relocate an already dislocated femoral head

back into the acetabulum. If the hip is dislocated, a palpable "clunk" can be noticed as the head slides back into place (positive Ortolani sign).

After the age of 6 weeks, this sensation is rarely detectable and should not be confused with snapping which is common and can occur in stable hips when ligaments in and around the hip create clicking noises.

Management

- Refer infants with risk factors or clinical findings during examination (e.g. positive Barlow and Ortolani manoeuvres, instability of the hips) without delay to a specialist for further evaluation and diagnosis by hip ultrasound.
- Developmental dysplasia of the hip can be treated with a brace or a Pavlik harness to help keep the hips and knees bent and the thighs spread apart for 2–3 months to allow normal hip growth.
- Surgery may be needed if the diagnosis is made after 6 months of age or if treatment with the Pavlik harness is unsuccessful.

5.6.13 Skin

Bruises

Many newborns sustain bruises or haematoma during delivery. These are more frequent in preterm or large babies and in newborns delivered with the help of instruments, e.g. forceps or vacuum extraction. Most of the bruises or haematoma are harmless and do not require any treatment.

- In the event of a larger haematoma ensure that the child is not anaemic and anticipate the development of jaundice. Otherwise, reassure the caregivers.

Skin peeling

Skin peeling is a harmless and common condition shortly after birth particularly in newborns born post-term.

- Top layer of the skin coming off with healthy skin underneath.

DO NOT prescribe any creams or lotions.

- Rule out the following rare causes of skin peeling: congenital syphilis (p. 164) and staphylococcal scalded skin syndrome (p. 398).
- Once ruled out, reassure the caregivers that skin peeling is harmless and will resolve spontaneously.

Erythema toxicum neonatorum

Very common skin condition in the first days of life. The eruption usually begins on the face and spreads to the trunk and limbs. Individual lesions appear and disappear within minutes or hours.

- Various combinations of flat red patches (erythematous macules) with overlying white or yellow, small bumps (papules) or pus-filled bumps (pustules)
- Lesions may be few or numerous and vary in size
- Palms and soles usually not affected

Typically resolves within first 2 weeks of life.

- Reassure the caregivers that no treatment is required.

Cradle cap (infantile seborrheic dermatitis)

Cradle cap is usually a harmless condition which appears before the age of 2 months and usually resolves by 6–12 months.

- Non-itchy, white or yellow, greasy or crusty patches on the scalp ("cradle cap"), face, trunk, limbs and skin folds.
- Reassure the caregivers that the rash is neither contagious or dangerous.
- Counsel to avoid unnecessary treatments as the rash will disappear usually on its own.
- For treatment of the scalp, advise to:
  - — Wash the scalp with baby shampoo
  - — Gently remove scales with a soft brush
  - — If necessary, soak crusts overnight with white petroleum jelly followed by shampooing in the morning.
- In more severe cases and if above measures have not been effective, give 1% to 2.5% hydrocortisone creme or antifungal cremes such as 2% ketoconazole or 1% econazole twice a day. If still no improvement after 4 weeks refer to a specialist.
- If other areas of skin are affected: counsel to bathe the baby at least once a day and to use an emollient as a soap substitute on the affected areas. Antifungal creams as above may be used once or twice a day, if required. Topical steroids are usually not recommended.

Neonatal acne

Neonatal acne is a common skin condition, which affects about 20% of newborns. It usually appears at about 2 weeks of age but can develop any time from birth to 6 weeks of age.

- Small bumps and pustules on the baby's nose and cheeks but can also affect the baby's forehead, chin, scalp, neck, back or chest.
- Neonatal acne usually clears up after a few weeks or months. It rarely causes a scar and tends to go away on its own in a few weeks to months. **DO NOT** prescribe acne medication.
- Counsel the caregiver to wash the baby's face with water only and to return if acne does not disappear within the first months.
- Refer to a specialist if no improvement or if acne appears for the first time after 6 weeks of age (infantile acne).

Milia

Milia are tiny white bumps on the newborn's nose, chin or cheeks present from birth, which are common in all newborns (40–50%).

- Few to numerous tiny white papular lesions on the face, usually around the nose and eyes, or more widely on the face, scalp and upper trunk and sometimes on the genitalia
- No treatment is needed, reassure the caregivers.

Heat or sweat rash (miliaria)

Heat or sweat rash is caused by blocked sweat ducts.

- 1–3 mm vesicular or papular rash on the neck, groins, armpits and face.
- Counsel the caregivers to avoid a hot and humid environment as much as possible and to keep the affected areas cool.
- Prescribe topical steroids (0.5% to 1% hydrocortisone) cautiously and only when necessary.

Nappy rash (perineal dermatitis)

Nappy rash is an inflammation of the skin covered by the nappy (diaper). The increased moisture and prolonged contact with stool and urine irritates the skin leading to dermatitis. Risk factors include diarrhoea, antibiotics, malabsorption and opiate withdrawal.

- Confluent erythema of the area around the genitalia and the anus

- Rule out other conditions affecting the nappy area such as atopic dermatitis (p. 392), seborrhoeic dermatitis (p. 389), allergic contact dermatitis (p. 396), impetigo (p. 393), perianal strep A infection (p. 391) and scabies (p. 396).
- Counsel the parent or caregiver how to treat the nappy rash (Counselling box 21).

If the nappy rash persists or occurs along with thrush in the baby's mouth, a candida infection may be present. Other signs of a candida infection include:

- Isolated spots beyond the border of the main rash
- Reddened skin has dots or pimples.
- If you suspect a candida infection, prescribe topical nystatin or an imidazole (e.g. miconazole) (p. 840).

Counselling box 21. How to treat a nappy rash

How to treat a nappy rash

- Change the nappies more frequently to keep the skin dry
- Use towels soaked in water or cotton balls to clean the area and apply a barrier cream (e.g. zinc paste or castor oil) at every nappy change
- Leave skin uncovered for as long as possible and keep the affected area dry
- Return if the nappy rash persists for more than a few days.

Congenital melanocytic naevus (mole)

- Light to dark pigmented lesion, varying in size from < 1.5 to > 20 cm (large)
- Lesion usually grows in proportion to the body over time.
- Moles are usually harmless and require no treatment.
- Large naevi are associated with an increased risk of melanoma. Follow up frequently.
- Naevi can be removed by surgical excision or laser ablation (depending on type and size of lesion) for cosmetic reasons or if they are large in size.

Congenital dermal melanocytosis ("Mongolian spot")

- Small to large patches of blue or black pigmentation, oval or irregular in shape, mainly in the lumbosacral region. Lesions are sometimes mistaken for bruises.
- Common in children of African or Asian ethnic background.
- ▶ Provide reassurance as most will fade in early childhood.

Brown (café-au-lait) spots

- Tan or light brown patches with well-defined borders.
- ▶ If fewer than six in number: reassure parent that the patches have no pathological significance and do not require any treatment.
- ▶ Refer if 6 or more: may be a sign of neurofibromatosis.

Infantile haemangioma (strawberry haemangioma)

Infantile haemangioma, also known as a strawberry naevus, is the most common benign vascular skin tumour, that affects 4% of all infants with increased prevalence in preterm newborns. It can be present at birth but mostly appears within the first weeks of life, increases in size until the age of 6 to 9 months then regress: 95% will disappear by puberty.

- Dark red marks, found anywhere on the body
- Superficial haemangiomas: raised, bright red area of skin, common on the eyelids, front and back of the head
- Deep haemangiomas: appear bluish in colour.
- ▶ Small haemangioma on the trunk, arms or legs may be observed. No treatment necessary.
- ▶ Large or multiple haemangiomas or affecting the eyes, ears, mouth, nose and anus require referral for further evaluation and management.

Salmon patches ("stork bites")

Salmon patches are very common birthmarks caused by a vascular malformation.

- Small, pink-coloured marks present from birth and mostly found on the forehead, upper eyelids, neck or other parts of the skin.
- ▶ They gradually fade over a few months and can persist to adulthood. No treatment needed.

Port-wine stain birthmark (naevus flammeus)

- Large, flat patch of purple or dark red skin with well-defined border caused by dilated blood capillaries.
- Often on the face, head, arms or legs and may vary in size.
- Less common than salmon patches.
- Unilateral facial stain can be associated with Sturge-Weber syndrome and epilepsy.
- These birth marks are permanent. Some may fade over time but most remain unchanged and may even deepen in colour.
- ▶ Treatment depends on the location and extent of the birth mark. It can be successfully removed by laser treatment. Refer for specialist advice and treatment before school entry.

5.7 Neonatal jaundice and hyperbilirubinaemia

Jaundice is the yellowish pigmentation of the skin and the whites of the eyes due to a high blood bilirubin level (hyperbilirubinaemia). More than 50% of newborns born at term and 80% of preterm infants have some jaundice. Jaundice may be physiological or nonphysiological depending on the level of bilirubin in the blood and the underlying condition.

Physiological jaundice

- Skin and eyes yellow but none of the signs or symptoms of non-physiological jaundice listed below.

Nonphysiological jaundice

- Starts on the first day of life
- Lasts > 14 days in term and > 21 days in preterm infants
- Fever
- Severe jaundice: palms and soles of the infant are deep yellow
- Acute bilirubin induced encephalopathy: excess sleepiness (lethargy), poor feeding, hypotonia
- Chronic bilirubin encephalopathy (kernicterus): high-pitched cry, fever, seizures

Risk factors:

- Serious bacterial infection or sepsis

- Haemolytic disease due to ABO or rhesus incompatibility or glucose-6-phosphate dehydrogenase deficiency
- Liver disease such as hepatitis or biliary atresia
- Excessive weight loss after birth
- Hypothyroidism or other metabolic conditions
- Cephalohaematoma or significant bruising
- Preterm birth or low birth weight
- Family history of severe jaundice in siblings.

Investigations

All newborns should be monitored for the development of jaundice, which should be confirmed by a bilirubin measurement (serum bilirubin or transcutaneous bilirubinometer), when possible, in all:

- Newborns if jaundice appears on day 1
- Preterm newborns (< 35 weeks) if jaundice appears on day 2
- Newborns if palms and soles are yellow at any age.

Management

Management depends on the bilirubin levels, the newborn's age and the underlying cause. Treatment may include frequent feeding, phototherapy or exchange transfusions.

- If the bilirubin is above the threshold (Table 25): refer urgently to hospital for phototherapy or exchange transfusion. If you suspect an infection or sepsis, give a pre-referral antibiotic if referral is delayed (cefotaxime 50 mg/kg IV, see p. 823).
- If bilirubin is below but within 2.9 mg/dL (50 µmol/L) of the threshold, monitor closely (repeat measurements on the next day and continue monitoring until bilirubin level is clearly decreasing).
- Counsel to continue breastfeeding to ensure adequate hydration and address breastfeeding problems, if needed (p. 85).

Table 25. Bilirubin thresholds for management of babies ≥ 35 weeks' gestational age

Age	35 to < 38 weeks with risk factors	35 to < 38 weeks without risk factors; ≥ 38 with risk factors	≥ 38 weeks without risk factors
24 h	140 µmol/L (8 mg/dL)	170 µmol/L (10 mg/dL)	200 µmol/L (12 mg/dL)
48 h	190 µmol/L (11 mg/dL)	220 µmol/L (13 mg/dL)	260 µmol/L (15 mg/dL)
72 h	230 µmol/L (13.5 mg/dL)	260 µmol/L (15 mg/dL)	310 µmol/L (18 mg/dL)
96 h	250 µmol/L (14.5 mg/dL)	290 µmol/L (17 mg/dL)	340 µmol/L (20 mg/dL)
≥ 120 h	260 µmol/L (15 mg/dL)	310 µmol/L (18 mg/dL)	360 µmol/L (21 mg/dL)

5.8 Delay in passing meconium

Timely passage of the first stool is an important sign for the well-being of the newborn. A delay in passing meconium > 48 hours may signal intestinal obstruction, gestational immaturity or severe illness. For newborns who have problems passing stools but have passed stools normally before, see Chapter 6 (p. 315).

History

Assess for risk factors:

- Maternal drugs during labour (magnesium sulfate, narcotics for pain control)
- Opioid use by the mother
- Premature and very low-birth-weight babies
- Other congenital conditions and syndromes (e.g. Down syndrome, p. 157).

Examination

Look for:

- Appearance of the anus, perianal and lumbosacral region

- Distended abdomen
- Tone, strength and reflexes of both legs.

Differential diagnosis

Table 26. Differential diagnosis of delay in passing meconium

Diagnosis	In favour
Hirschsprung disease	• Abdominal distention and dark green (bilious) vomiting • Digital rectal examination: tight anal sphincter, empty rectum, explosive release of stool and air upon removal of the finger. Should only be undertaken by health care providers experienced in the examination and interpretation of its findings.
Cystic fibrosis (p. 598)	• Abdominal distension, pain, palpable mass.
Congenital malformation	• Abnormal findings during exams of the legs, anus or lumbosacral region.
Imperforate anus (p. 138)	• Absence of the anus.
Anterior displacement of anus (p. 137)	• Anus looks normal but is displaced closer to the vagina or to the base of the scrotum.
Congenital hypo-thyroidism (p. 161)	• Excessive sleepiness, poor feeding, low and floppy muscle tone, a hoarse cry, hypothermia, bradycardia, prolonged jaundice, low body temperature.

Management

- If you identified any of the above underlying risk factors, the delay in passing meconium is usually self-limited. Follow up in 24–48 hours.
- Consider conditions in Table 26.
- Refer urgently and without delay any newborn with suspicion of:
  - — Hirschsprung's disease
  - — Cystic fibrosis
  - — Congenital malformation
  - — Imperforate anus.

5.9 Excessive crying

Crying is a normal physiological behaviour in young infants. Excessive crying ("infantile colic") is defined as crying > 3 hours/day for > 3 days/week for > 3 weeks. It usually appears in babies in the third week of life, manifesting itself as sudden periods of acute and persistent crying. These episodes of agitation are more frequent at the end of the day and in firstborn children. The caregivers are often exhausted and confused, having received conflicting advice, and unsure whether it is normal or how to alleviate the baby's discomfort. Infants with colic are usually thriving and there is no identifiable medical cause and no worrying findings on examination.

History

- Time of onset of excessive crying after second week of life
- Duration of crying
- Associated symptoms such as drawing up of legs, weight loss, bowel habit and diet
- Hunger: more likely if baby has frequent feeds, poor weight gain or inadequate milk supply
- Baby's feeding and behaviour
- Tiredness of the parents.

RED FLAGS

- Sudden onset of crying: this is untypical for colic. Look for a specific cause including infection or incarcerated inguinal hernia
- Excessive crying is a risk factor for shaken baby syndrome (p. 639): enquire about the psychosocial situation of the child, including parent well-being and maternal postnatal depression.

Examination

- Perform a routine newborn examination including weight and growth measurements. Usually no worrying findings on examination.
- Assess breastfeeding. Check the baby's sucking position, and the duration of a feed.
- Rule out causes such as hunger and inadequate feeding or other medical causes such as infection (e.g. otitis media), inborn errors of metabolism (p. 160), constipation (p. 315), inguinal hernia incarceration (p. 375),

intussusception, hair tourniquet (hair tied around a digit or penis). See other differential diagnoses in Table 27.

Table 27. Differential diagnosis of colic/crying

Diagnosis	In favour
Cow's milk allergy (p. 293)	• Blood or mucus in diarrhoea, vomiting, poor weight gain, family history or signs of atopy (eczema/ wheezing), significant feeding problems.
Gastro-oesophageal reflux disease (p. 306)	• Frequent vomiting (e.g. 4 or more times per day) and feeding difficulties • Effortless regurgitation/vomiting after feeding • May be irritable with back arching (dystonic neck posturing or Sandifer syndrome) • Sometimes failure to thrive or respiratory symptoms (chronic cough, stridor, wheezing).

Management

- Reassure the caregivers that colic is harmless and not a sign of illness or a neurological condition. It disappears with time.

DO NOT prescribe any medication: antireflux medication, anticonvulsants or antihistamines are not needed and can cause harm. No treatment has been shown to work in colic, and some drugs have significant side-effects.

- If parents are still concerned, advise them to keep a diary noting sleeping and crying behaviour and schedule a follow-up to review if crying is normal.
- Ask parents and other family members not to smoke around the baby. If the mother smokes, provide support for her to quit. If not feasible suggest that she does not smoke before or during breastfeeds.
- If any problems with feeding, provide advice (p. 81).
- Counsel on techniques for how to best comfort a crying baby: tell the caregivers to hold the baby close with gentle movement and gentle pressure on the abdomen (see illustrations below).
- Counsel on promotion of early childhood development (p. 60) and link caregivers to additional support if needed.

Different ways to hold a colicky baby

Referral

- Consider referring the baby if:
  - The cause of crying remains unclear
  - The baby appears sick
  - The baby is not thriving or
  - You are worried about the safety of the baby.
- Refer mothers at risk of postpartum depression.

5.10 Vomiting

Vomiting or, more often, posseting (bringing up or regurgitating milk) is a relatively frequent symptom during the newborn period. If the baby is otherwise feeding and growing well this is physiological. No treatment is required and the problem will resolve around the second year of life. However, vomiting in newborns can be a sign of sepsis, gastroesophageal reflux, bowel obstruction or a congenital disease (Table 28).

History

- Onset, timing and duration of vomiting
- Amount, frequency and content of vomit (bile, blood, milk)
- Relation of vomit to amount, type and time of feeds
- Associated with coughing (self-resolving)
- Associated with other signs or symptoms.

Examination

- Observe feeding and vomiting, if possible.
- Check for signs of dehydration: dry skin or mucosa, sunken eyes and fontanelle, less than 6 wet nappies per day.
- Check for signs of bowel obstruction.

DO NOT give antiemetics in newborns.

Table 28. Differential diagnosis of vomiting in infants

Diagnosis	In favour
Gastroesophageal reflux (p. 306)	• Various amounts of partially digested milk after feeding • Effortless regurgitation/vomiting after feeding • Irritable newborn with back arching (dystonic neck posturing, p. 306) • Sometimes failure to thrive or respiratory symptoms (chronic cough, stridor, wheezing).
Feeding problems (p. 86)	• Overfeeding, errors in preparing food (formula).
Acute gastroenteritis (p. 275)	• Diarrhoea, fever.
Other infections	• Fever or localizing signs • Acute otitis media (p. 210), urinary tract infection (p. 356), meningitis (p. 235), pneumonia (p. 184), pertussis (p. 206) • Bile-stained (green) vomit.
Hypertrophic pyloric stenosis	• Projectile nonbilious vomiting within minutes of feeding • Appears at 2–12 weeks of life • Visible gastric peristalsis or epigastric mass.
Milk allergy (p. 293)	• Appears in the first few months of life • Vomiting, gastroesophageal reflux, colic, constipation, atopic dermatitis (eczema).

Diagnosis	In favour
Small bowel obstruction (volvulus, duodenal atresia, malrotation, invagination, intussusception)	• Cramping abdominal pain • Distension • No flatus • Abdominal guarding and tenderness • Sometimes, peristalsis waves can be seen through the abdominal wall.
Tracheo-esophageal fistula	• Vomiting milk shortly after feeds with respiratory distress • Cough • Excessive saliva • Impossible to insert a nasogastric tube.
Inborn error of metabolism	• Nonspecific: poor feeding, lethargy, hypotonia, convulsions, breathing problems • Hypoglycaemia, acidosis.
Subdural haemorrhage	• History and/or other signs of child abuse • History of trauma or neurosurgery.

Treatment

If the baby is feeding and growing well, no treatment is required and the problem will resolve.

- Reassure the caregivers and counsel to continue breastfeeding by giving smaller amounts more frequently (i.e. reduce the time for breastfeeding at each feed but breastfeed more often).

Referral

- Refer urgently newborns with vomiting if any of the following symptoms:
  - Vomiting since birth, excessive or long-lasting
  - Failure to thrive
  - Blood in the vomit
  - Signs of hypertrophic pyloric stenosis
  - Signs of tracheoesophageal fistula
  - Signs of bowel obstruction
  - Signs of dehydration (p. 281)

— Signs of sepsis: fever, lethargy, poor feeding, respiratory distress, irritability, poor perfusion or grey/mottled discoloration.

5.11 Down syndrome (trisomy 21)

One in 700 newborns is born with an extra copy of their 21st chromosome. This causes physical and mental developmental difficulties. A child with Down syndrome also may have heart defects and problems with vision and hearing. How severe or mild these problems are varies from child to child. It is important for the parents to hear that children with Down syndrome can live long and fulfilling lives.

Diagnosis

Down syndrome is usually diagnosed prenatally.

Postnatally newborns may present the following features:

- Small and round head with a flat back
- Downward slanting eyes with narrow opening between the eyelids
- Wide space between eyes (hypertelorism)
- Skin fold of the upper eyelid covers the inner corner of the eye
- Single palmar crease
- Wide space between great and second toe
- Small ears
- Small mouth with large tongue (macroglossia)
- Muscular hypotonia and loose ligaments.

Most children with Down syndrome will have some but not all of these features. An isolated feature in an otherwise healthy newborn does not suggest Down syndrome.

Management

- Link parents or caregivers to support groups and other families with children with Down syndrome.
- Refer to specialist for further assessment, as Down syndrome can be associated with duodenal obstruction, cardiac malformation, hypothyroidism and other conditions. Treat according to the specialist treatment plan.
- Monitor feeding and growth and provide feeding advice (p. 81).

- Monitor development and initiate early intervention to support the newborn and family to live fulfilling and healthy lives. See p. 574 for treatment and long-term support.

5.12 Fetal alcohol spectrum disorder

Fetal alcohol spectrum disorder includes prenatal growth problems, developmental difficulties, and characteristic face and head features caused by exposure to alcohol of the unborn baby following maternal alcohol consumption during pregnancy. Binge drinking in early pregnancy (> 5 units in one sitting) can lead to severe organ malformation and even be lethal; drinking in late pregnancy can impact growth and central nervous system development.

Diagnosis

Prenatal alcohol exposure can be assessed by asking the mother about consumption before and during pregnancy (reliable answers require confidentiality and trust). Diagnosis may be difficult if alcohol consumption is concealed.

Signs and symptoms

- Irritability, tremulousness and marked startle reflexes (neonatal withdrawal syndrome)
- Growth delay
- Small palpebral fissures, smooth philtrum and thin upper lip
- Microcephaly at birth
- Postnatal slowing of head growth
- Poor feeding and slow weight gain
- Renal and cardiac malformations.

Management

- Assess the family circumstances of the newborn and initiate early intervention. Link parents or caregivers to support groups.
- See p. 583 for information on management and long-term support.
- Refer to specialist for further assessment.

5.13 Congenital heart disease

One in 100 newborns is born with a congenital heart problem. They are more common in preterm newborns and about 30% are associated with other congenital problems. Some can be diagnosed with an antenatal ultrasound. Serious congenital heart disease usually becomes evident soon after birth when the fetal circulation changes. Less serious congenital heart disease may not be diagnosed until later in childhood.

Signs and symptoms

Depending on the underlying heart defect, signs and symptoms vary and might include:

- Cyanosis or differential cyanosis: saturation in the feet less than in the right hand
- Delayed capillary refill time
- Poor femoral pulses
- Dyspnoea and tachypnoea
- Heart murmur (can be absent in babies with severe critical heart disease), loud second heart sound or gallop rhythm, tachycardia or bradycardia, apex beat displaced to the left
- Enlarged palpable liver
- Poor urine output
- Difficulty in feeding or breastfeeding, sweating while feeding
- Failure to thrive
- Swelling in the legs, abdomen or areas around the eyes.

Investigations

Pulse oximetry at hands and feet.

Treatment and referral

Others are more complex and require several operations over several years.

- Refer stable children with congenital heart disease for specialist assessment. Follow the specialist treatment plan (p. 584).
- Some congenital heart defects in children are mild and do not need treatment.

- Transfer critical newborns **urgently** to the hospital. Before and during referral:
  - If $SpO_2 \leq 90\%$, give oxygen.
  - Treat danger signs (p. 170) and monitor vital signs.
  - If you suspect a duct-dependent congenital heart defect (differential cyanosis), ask the transfer service to bring prostaglandin E1 when collecting the newborn. Prostaglandin E1 is required to keep the ductus arteriosus open. Delay in starting prostaglandin infusion can have deleterious effects and lead to death.
  - Establish reliable vascular access.

5.14 Congenital stridor (laryngomalacia)

Laryngomalacia is a congenital softening of the tissues of the larynx above the vocal cords. It is the most common congenital cause of upper airway obstruction and stridor in infancy. Symptoms appear shortly after birth and can increase over 6 to 8 months before gradual improvement and spontaneous resolution within 12 to 24 months:

- Noisy breathing when crying or eating, or during upper airway infections
- Inspiratory or expiratory retraction.

Treatment and referral

- Treatment depends on disease severity; observation alone is appropriate for most cases.
- Refer if any danger signs are present or there is a lack of weight gain.

5.15 Newborn with a possible metabolic condition

Many metabolic diseases (inborn errors of metabolism) can be detected by newborn metabolic screening (p. 119) using dried blood spots taken at the age of 48 to 72 hours. The number of conditions tested may vary by country.

History

Risk factors:

- Consanguinity of parents
- Previous miscarriage/stillbirths
- Unexplained death of siblings
- Intrauterine growth restriction.

Signs and symptoms

Newborns with a metabolic condition show nonspecific symptoms a few hours to days after birth that can resemble central nervous system infection, sepsis or cardiac decompensation.

- Macrocephaly or microcephaly
- Cataract
- Nystagmus
- Jaundice
- Hypotonic or hypertonic muscle tone
- Unusual smell of urine or body
- Poor feeding, vomiting or diarrhoea
- Growth faltering
- Apnoea
- Hypothermia or hyperthermia
- Enlarged palpable liver, spleen or both
- Neurological signs.

Treatment

- When you suspect a metabolic disease seek guidance from a specialist centre and arrange urgent referral.
- Treat danger signs, if any (p. 170) and monitor vital signs frequently.
- Measure blood sugar and treat hypoglycaemia (p. 173).
- Manage seizures, if any (p. 173).
- Insert IV line to correct dehydration and replace ongoing losses in the event of diarrhoea and vomiting.
- Avoid breast or formula milk until galactosaemia is excluded.

5.16 Congenital hypothyroidism

Hypothyroidism is the most common congenital endocrinopathy. The most common cause is a shortage of iodine in the mother's diet, which is vital in the production of thyroid hormones. Genetic causes account for about 15 to 20% of cases. Thyroid hormones play a vital role in the development of the central nervous system. It is important to detect this condition early as

it can lead to severe developmental delay, neurocognitive deficiencies and growth failure.

Diagnosis

Neonatal screening programmes detect congenital hypothyroidism.

Symptoms

Suspect hypothyroidism in any newborn with:

- Excessive sleepiness, poor feeding, low and floppy muscle tone, a hoarse cry, constipation, hypothermia, bradycardia, prolonged jaundice, low body temperature
- Rarely, severe prenatal onset with large anterior fontanelle, persistent posterior fontanelle, umbilical hernia and macroglossia.

Investigations

- Elevated TSH at birth confirms the diagnosis.

Treatment and referral

- Refer newborns with clinically suspected hypothyroidism or those with raised TSH detected during metabolic screening to a specialist for further assessment and initiation of thyroxine replacement.

5.17 Newborns of mothers with infectious diseases

Congenital infections of the unborn baby or newborn are caused by pathogens transmitted from an infected mother to her child during pregnancy (transplacental transmission) or delivery. While most congenital infections will be diagnosed in hospital or through screening tests of the mother during pregnancy, it is still important to be aware of their possibility when assessing a newborn, e.g. cytomegalovirus, toxoplasmosis, syphilis, parvovirus B19, varicella, hepatitis B, HIV, listeria, rubella, herpes simplex virus. Congenital infections increase the risk for long-term problems and in the most severe cases can cause death of the unborn baby or early death of the newborn.

In the first days of life, newborns may be exposed to mothers with infectious diseases, which require measures to prevent infection of the newborns.

5.17.1 Congenital cytomegalovirus infection

Most common congenital viral infection. Symptomatic disease may result from maternal infection at any time during pregnancy, although the risk is highest in the first trimester.

Symptoms

Approximately 10% are symptomatic at birth or develop clinical features later during infancy or childhood.

Symptoms at birth include:

- Prematurity
- Low birth weight
- Microcephaly
- Enlarged liver and spleen
- Rash
- Jaundice
- Petechiae
- Seizures
- Retinitis.

Diagnosis

- Congenital infection can be confirmed by PCR detecting CMV DNA in the newborn's saliva, urine or blood in the first 3 weeks of life.

Treatment

- Refer infants with signs of congenital CMV disease for treatment with antiviral medications such as IV ganciclovir or valganciclovir. Prolonged treatment requires advanced laboratory facilities to carefully monitor potential drug toxicity.
- Ensure hearing and vision tests.

5.17.2 Congenital rubella infection

Women infected with the rubella virus in early pregnancy (especially during the first trimester) have a 90% chance of passing the virus on to the unborn baby.

Symptoms

Newborns may be asymptomatic or present with birth defects described as congenital rubella syndrome:

- Hearing impairment or loss
- Eye defects (cloudy cornea, cataracts)
- Congenital cardiac defects.

Treatment

- Refer newborn with eye or heart problems for specialist assessment and management.
- No specific treatment is available. Coordinate multidisciplinary care to support the child and family (p. 2).

5.17.3 Congenital syphilis

Congenital syphilis is a chronic infectious disease caused by the spirochete *Treponema pallidum*, acquired by the unborn baby in the uterus.

Symptoms

Symptoms may not become apparent until several weeks or months after birth and, in some cases, may take years to appear.

- Often low birth weight
- Palms and soles: red rash, grey patches, blisters or skin peeling
- "Snuffles": highly infectious rhinitis with nasal obstruction
- Abdominal distension due to enlarged liver and spleen
- Jaundice
- Anaemia.

Diagnosis

- If you suspect syphilis, check the mother's home-based records for the results of the Venereal Disease Research Laboratory (VDRL) test.
- Newborns of seropositive mothers require a careful examination and a VDRL test.

Treatment

- Newborns with a normal physical examination and VDRL titre less then fourfold the maternal titre, born to mothers with syphilis who have been adequately treated and shown no signs of reinfection: no treatment required, monitor the infant (VDRL monthly).
- Refer newborns who are symptomatic or with confirmed congenital syphilis and those who are clinically normal but whose mothers had untreated or inadequately treated syphilis (including treatment within 30 days of delivery) or syphilis treated with nonpenicillin regimens for treatment with:
  - Benzyl penicillin (G) 50 000 U/kg dose every 12 hours (first 7 days of life) then every 8 hours (infants > 7 days of life) IV for 10–15 days **or**
  - Procaine benzyl penicillin (G) 50 000 U/kg/day as a single intramuscular dose (deep IM injection) daily for 10–15 days

Treatment will be initiated at the hospital. Stable newborns can be discharged and treatment completed on outpatient basis.

- Treat the mother and partner for syphilis and check for other sexually transmitted diseases.

5.17.4 Congenital toxoplasmosis

Toxoplasmosis is caused by infection with the parasite *Toxoplasma gondii*, which crosses the placenta to the unborn baby.

Symptoms

Most infected newborns are asymptomatic at birth. Typical clinical features include the classic triad of congenital toxoplasmosis:

- Chorioretinitis (often bilateral)
- Intracranial calcifications
- Hydrocephalus (or microcephaly).

Other occasional findings include:

- Respiratory distress and pneumonitis
- Rashes (maculopapular, petechial or both)
- Myocarditis
- Prematurity
- Intrauterine growth restriction
- Enlarged liver and spleen

- Jaundice
- Seizures
- Hearing problems
- Nephrotic syndrome.

Treatment

Congenitally infected babies can be treated with pyrimethamine and sulfadiazine, beginning in utero (treatment of the pregnant woman) and continuing through the first year of life, to reduce the severity of disease and subsequent neurological problems. Ensure that treatment has been initiated otherwise refer for confirmation of diagnosis and treatment.

5.17.5 Herpes simplex virus

Usually caused by HSV-2 as a result of direct contact with infected vaginal secretions during delivery (occasionally infection occurs in utero or postnatally). Mother-to-child transmission is high among women who acquire the virus near the time of delivery. Left untreated, neonatal HSV can lead to severe long-term consequences and death.

High risk of herpes infection:

- Newborn with symptoms of neonatal herpes **or**
- Active primary or unknown maternal genital herpes at the time of delivery **or**
- Active recurrent maternal genital herpes at the time of delivery with any of the following risk factors: rupture of membranes ≥ 6 hours before delivery (vaginal or caesarean), birth weight < 2000 g, preterm ≤ 37 weeks, skin lacerations, maternal HIV infection.

Low risk of herpes infection:

- Active recurrent maternal genital herpes with none of the above risk factors.

Symptoms

Most newborns are asymptomatic at birth. Clinical features usually present at 7 to 14 days of life:

- Vesicular lesions on skin, eye and mouth. May seem initially benign but there is a high risk of progression to the central nervous system or disseminated disease if not treated

- Central nervous system disease: encephalopathy and seizures
- Disseminated disease: nonspecific signs of sepsis (irritability, lethargy, fever, poor feeding).

Management

- Use personal protective equipment (gloves and protective gown) at each contact with the newborn.
- Refer newborns with a high risk of herpes infection, even if currently asymptomatic, for treatment with IV aciclovir.
- Newborns with a low risk of herpes infection: advise parents to return if symptoms develop and follow up in 3–5 days. If the newborn becomes symptomatic, refer to hospital for IV aciclovir (as above).
- Encourage breastfeeding if the mother has no breast lesions.
- Explain to the parents or caregivers how important hand hygiene is when they are handling the baby.

5.17.6 Newborns of mothers with HIV

Newborns are at risk of contracting human immunodeficiency virus (HIV) vertically by mother-to-child transmission if they are exposed to HIV in utero, during birth and breastfeeding. The major risk factor is a high maternal viral load. Without intervention, the risk of vertical HIV infection can be up to 30% and, compared to adults, vertically HIV-infected children progress much faster to AIDS. See p. 623 for management of HIV infection.

Prevention of mother-to-child transmission of HIV

- Treatment is usually initiated in hospital. Monitor the treatment and adjust dosages according to increasing weight of the baby.

If **low transmission risk** (effective maternal antiretroviral therapy (ART) and successfully suppressed viral load):

- Provide postnatal prophylaxis with nevirapine (NVP) or zidovudine (AZT) alone for 4–6 weeks.

If **high transmission risk** (mother was first identified as HIV-infected at delivery or in the postpartum, mother was infected during pregnancy or during breastfeeding, started ART late in pregnancy, or did not achieve viral suppression by the time of delivery):

- Provide dual drug prophylaxis (zidovudin (AZT) plus nevirapine (NVP)) for the first 6 weeks. In breastfeeding infants, this should be followed by

either an extra 6 weeks of zidovudin plus nevirapine or an extra 6 weeks of nevirapine alone (Table 29).

Breastfeeding considerations

Breastfeeding is recommended in most of the world for mothers living with HIV, while in Europe formula feeding is considered the preferred option for the child, if is affordable and safe (p. 83).

Table 29. Dual drug prophylaxis for infants at high risk of mother-to-child transmission of HIV

Options	Dose 0–6 weeks	Dose 6–12 weeks (Options)	
	Zidovudin (AZT) + nevirapine (NVP)	**Zidovudin (AZT) + nevirapine (NVP)**	**Nevirapine only**
1. Syrup[a]	AZT dose 1.5 mL (15 mg) twice daily	AZT dose 6 mL (60 mg) twice daily	NVP dose 2 mL (20 mg) once daily
	NVP dose 1.5 mL (15 mg) twice daily	NVP dose 2 mL (20 mg) once daily	
2. Syrup and single drug tablets[b]	AZT dose 1.5 mL (15 mg) twice daily	AZT dose 1 tab (60 mg) twice daily	NVP ½ tab (25 mg) once daily
	NVP dose 1.5 mL (15 mg) twice daily	NVP dose ½ tab (25 mg) once daily	

AZT: zidovudine, NVP: nevirapine

[a] Challenge: accuracy of dosing for all drugs and one type of formulation for all 12 weeks.

[b] Advantage: combines accuracy of syrup dosing in the first 6 weeks and ease of tablets from 6 to 12 weeks. Challenge: ½ NVP tab is a slight overdose (25 mg vs 20 mg).

5.17.7 Newborns of mothers with hepatitis B

Transmission of hepatitis B virus from mother to child occurs primarily from blood exposure during labour or delivery. Perinatal infection is the most important cause of chronic hepatitis B virus infection. Long-term consequences of hepatitis B infection include chronic hepatic insufficiency, cirrhosis and hepatocellular carcinoma.

Symptoms

Infected newborns are asymptomatic at birth.

Prevention of mother-to-child transmission for hepatitis B

- Vaccinate the child as soon as possible after birth (ideally no later than 12 hours after birth) with a monovalent hepatitis B vaccine as the birth dose.
  - If administration within 12 hours is not feasible, a late birth dose can be given at any time up to the day of the next dose of the primary schedule (usually at 6 weeks), although effectiveness declines progressively in the days after birth.
- If available, administer hepatitis B immunoglobulin IM: 100 IU/kg (in the opposite leg to hepatitis B vaccination). It is most effective if given within 12 hours of birth but can be given at up to 7 days of life.
- Provide further vaccinations according to national immunization schedule with either monovalent or combination vaccines.
- Encourage continuation of breastfeeding.

5.17.8 Newborns of mothers with COVID-19

Mothers with COVID-19 and their babies should remain together day and night and practice skin-to-skin contact, including kangaroo mother care, especially immediately after birth and during initiation of breastfeeding. The benefits of breastfeeding substantially outweigh the potential risks of transmission.

- Encourage mothers with COVID-19 to initiate or continue breastfeeding.
- Counsel on general hygiene measures (p. 776).

5.17.9 Newborns of mothers with tuberculosis

If the mother has active lung tuberculosis (TB) and was treated for < 2 months before the birth, or if TB was diagnosed after the birth:

- Reassure the mother that it is safe for her to breastfeed her infant.

DO NOT give BCG vaccine to the newborn at birth.

- Give prophylactic isoniazid 10 mg/kg orally once per day (p. 819).
- Re-evaluate the infant at 6 weeks for weight gain and chest X-ray.
- If findings suggest active disease, start anti-TB treatment based on national guidelines (p. 633).
- If the infant is doing well and tests are negative, continue prophylactic isoniazid to complete 6 months' treatment.

- Delay BCG vaccination until 2 weeks after treatment is completed. If BCG has already been given, repeat 2 weeks after the end of isoniazid treatment.

5.18 The sick newborn with danger signs

Newborns and young infants often present with nonspecific symptoms and signs that indicate severe illness particularly serious bacterial infection. All primary health care providers who encounter newborns and infants must recognize and provide at least initial care for the problem.

Serious bacterial infection may be due to various infections including septicaemia, meningitis and congenital pneumonia. Newborns with the following risk factors are more likely to develop serious bacterial infection:

- Premature rupture of membranes (> 18 h before delivery)
- Mother had fever > 38 °C before delivery or during labour
- Amniotic fluid was foul-smelling or purulent (chorioamnionitis)
- Maternal colonization with Group B streptococcus
- Preterm delivery.

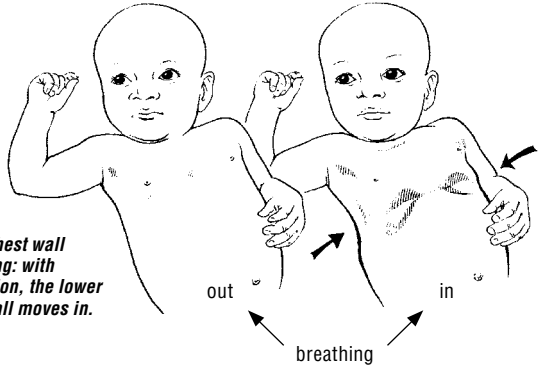
Breathing difficulties may be due to sepsis, respiratory infections, cardiac condition or other congenital problems (tracheoesophageal fistula, lung malformations, oesophageal atresia, choanal atresia, diaphragmatic hernia). Congenital problems will usually be identified in hospital. Babies born at home may have respiratory distress syndrome (preterm newborn) or meconium aspiration syndrome.

Examination

RED FLAGS

Newborns and infants presenting with any of the following danger signs require urgent interventions and immediate referral:

- Not feeding well, inability to suck
- Convulsions
- Drowsy or unconscious
- Movement only when stimulated or no movement at all
- Central cyanosis
- Temperature < 35.5 or > 38 °C



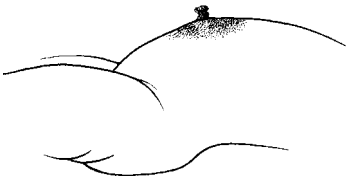
Lower chest wall indrawing: with inspiration, the lower chest wall moves in.

- Breathing difficulties:
  - — gasping
  - — grunting
  - — nasal flaring
  - — severe chest indrawing
  - — fast breathing (≥ 60 breaths/min)
  - — slow breathing (< 30 breaths/min).
- Severe jaundice (appears on the face during the first day of life or extends to the palms and soles at any time).

Signs of serious bacterial infection

All of the **danger signs** listed above are signs of serious bacterial infection, but there are other **localizing signs of infection**:

- Signs of pneumonia (see signs of breathing difficulties above)
- Many or severe skin pustules
- Umbilical redness extending to the periumbilical skin (omphalitis)



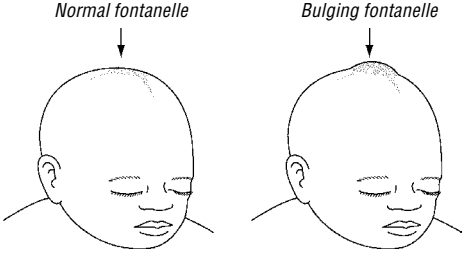
Periumbilical flare in umbilical sepsis. The inflammation extends beyond the umbilicus to the abdominal wall.

- Umbilicus draining pus
- Severe abdominal distension and tenderness
- Painful joints, joint swelling, reduced movement and irritability if these parts are handled.

Signs of meningitis

Suspect meningitis if signs of serious bacterial infection are present (see above), particularly if any one of the following is present:

- Drowsy, lethargic or unconscious
- Convulsing
- Irritable
- Bulging fontanelle
- High-pitched cry.



Bulging fontanelle – sign of meningitis in young infants with an open fontanelle

Investigations

- Blood glucose
- Pulse oximetry

Emergency management of newborns with danger signs

The aim of initial management of a newborn presenting with these signs is stabilization and preventing deterioration.

- Assess ABCDE (p. 716) and manage accordingly.
- Keep in mind the following specific considerations in the management of hypoglycaemia and seizures in newborns:

- For hypoglycaemia (glucose < 2.2 mmol/L or < 40 mg/dL), give 10% glucose 2 mL/kg IV. If blood glucose cannot be measured, assume hypoglycaemia and give glucose IV. If you cannot insert an IV line, give expressed breast milk or glucose through a nasogastric tube.
- For convulsions, treat with phenobarbital (p. 837). Watch for apnoea. Always have a bag-mask available.

- For suspected serious bacterial infection, meningitis or breathing difficulties: if the baby is acutely unwell or there is likely to be a delay in transfer, give pre-referral antibiotics (cefotaxime 50 mg/kg IV, see p. 823). Seek advice from referral centre.
- Arrange urgent referral to hospital for further evaluation and management (see p. 782 on how to transfer sick newborn babies and young infants) and inform ambulance services if oxygen will be needed for safe transportation of the newborn.

Notes

CHAPTER 6

The child or adolescent presenting with a specific complaint or symptom

This chapter provides guidelines for considering a differential diagnosis based on the main presenting complaints and managing the most important conditions in children older than 2 months and adolescents. See Chapter 5 for the management of these conditions in newborns and infants < 2 months of age. See Chapter 8 for conditions specific to adolescents.

6.1 Cough or difficulty in breathing

Most coughs are due to viral infections.

DO NOT give routinely: antibiotics (not active against viruses and do not prevent pneumonia), remedies containing atropine, codeine, codeine derivates or alcohol (may be harmful), mucolytics or antihistamine-medicated nose drops.

Cough and difficulty in breathing are common in young children. Underlying causes range from mild, self-limiting illness to severe, life-threatening disease.

Most episodes of cough are due to the common cold, each child having several episodes a year. The commonest severe illness and cause of death that presents with cough or difficulty in breathing is pneumonia, which should be considered first in any differential diagnosis (Table 30, p. 180).

Be aware of the current epidemiological situation in the country and community

History

Pay attention to:

- Cough:
  - Duration in days, as causes of cough differ for those lasting longer than 14 days (p. 202)
  - Paroxysms with whoops or vomiting or central cyanosis.
- Personal or family history of asthma
- History of fever
- Underlying chronic conditions (e.g. cystic fibrosis)
- History of choking or sudden onset of symptoms
- Vaccination history
- For cough lasting longer than 14 days, exposure to a person with tuberculosis (or chronic cough) in the family.

Examination

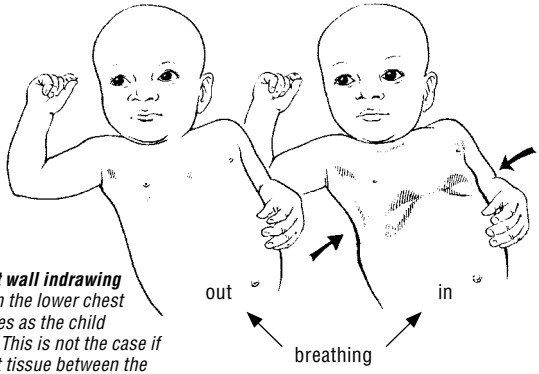
The symptoms and signs listed below are a guide to reach a diagnosis. Not all children will display every symptom or sign.

General

- Fever
- Central cyanosis
- Apnoea, gasping, grunting, nasal flaring, audible wheeze, stridor
- Head nodding (movement of the head in phase with inspiration indicating severe respiratory distress)
- Tachycardia
- Severe palmar pallor.

Chest

- Respiratory rate (count for 1 min when the child is calm)
- Fast breathing
  - ≥ 60/min in newborns <2 months of age
  - ≥ 50/min in children 2–11 months of age
  - ≥ 40/min in children 1–5 years of age
  - For older children, see Table 128 (p. 713)



Lower chest wall indrawing *occurs when the lower chest wall collapses as the child breathes in. This is not the case if only the soft tissue between the ribs or above the clavicle retracts as the child breathes in.*

- Lower chest wall indrawing
- Hyperinflated chest
- Raised jugular venous pressure
- On auscultation, coarse crackles, no air entry or bronchial breath sounds or wheeze
- Abnormal heart rhythm on auscultation
- Percussion signs of pleural effusion (stony dullness) or pneumothorax (hyperresonance).

Abdomen

- Abdominal masses, e.g. lymphadenopathy
- Enlarged liver or spleen.

Investigations

- Pulse oximetry to detect hypoxia and as a guide for potential oxygen therapy
- Chest X-ray, if available, only in children with signs of severe pneumonia or pneumonia that do not respond to treatment or complications, or when you suspect tuberculosis or unclear diagnosis.
- Other investigations depending on the suspected diagnosis.

Table 30. Differential diagnosis of cough or difficulty in breathing

Diagnosis	In favour
Common cold (p. 181)	• Cough, nasal discharge • Good general appearance • Absence of respiratory difficulty and stridor.
Pneumonia (p. 184)	• Cough with fast breathing • Lower chest wall indrawing • Fever • Coarse crackles, bronchial breath sounds or dullness to percussion • Grunting.
Asthma (p. 587)	• Recurrent episodes of shortness of breath or wheeze • Night cough or cough and wheeze with exercise • Hyperinflation of the chest • Prolonged expiration • Reduced air entry • Good response to bronchodilators, unless very severe.
Bronchiolitis (p. 194)	• Wheezing episode at time of seasonal bronchiolitis • Age usually < 1 year.
Recurrent wheezing (p. 196)	• Age usually < 5 years • Recurrent episodes of shortness of breath or wheeze always related to coughs and common colds.
Acute bronchitis (p. 183)	• Common cold • Following persistent cough, sometimes productive (sputum).
Croup (p. 199)	• Inspiratory stridor • Barking cough • Hoarse voice.
Pertussis (p. 206)	• Paroxysms of cough followed by whoop, vomiting, cyanosis or apnoea • No symptoms between bouts of cough • Subconjunctival haemorrhages • History of no or incomplete DPT vaccination • No fever.

Diagnosis	In favour
COVID-19 (p. 188)	• History of exposure to COVID-19 or positive RT-PRC or antigen test for SARS-CoV-2 • Variety of respiratory symptoms ranging from upper respiratory tract infection to pneumonia • Sometimes loss of smell, loss of taste.
Tuberculosis (p. 631)	• Chronic cough (> 14 days) • History of contact with TB patient • Poor growth, wasting or weight loss.
Heart failure (p. 328)	• History of heart disease or heart murmur • Abnormal heart rhythm (very fast or slow) • Enlarged neck veins in older children • Enlarged liver • Fine crackles in the lung bases.
Foreign body aspiration (p. 503)	• History of sudden choking • Sudden onset of stridor and respiratory distress • Focal areas of wheeze or reduced breath sounds.
Pneumo-thorax (p. 732)	• Sudden onset, sometimes after major chest trauma • Hyperresonance on percussion of one side of the chest • Shift of mediastinum to opposite side suggests a tension pneumothorax.
Panic attack (p. 536)	• More common in adolescents • History of fear, anxiety, often triggered by stressor component • Fast and deep breathing (hyperventilation) • Chest tightness • Tingling or spasms in lips, hands or feet, dizziness.

See Table 46 (p. 269) for additional causes of difficulty in breathing in children or adolescents coming from abroad.

6.1.1 Cough or common cold

These are common, self-limiting viral infections that require only supportive care. Antibiotics should not be given. Wheeze or stridor may occur in some children, especially infants. Most episodes end within 14 days. Cough lasting 14 days or more may be caused by asthma, pertussis, tuberculosis or other diseases (p. 202).

Diagnosis

Common features:

- Cough
- Nasal discharge
- Mouth breathing with nasal obstruction
- Fever.

The following are absent:

- Danger signs: inability to drink/breastfeed, vomiting everything, lethargy, convulsions or altered consciousness
- Signs of pneumonia (p. 184)
- Stridor when the child is calm.

Wheezing may occur in young children (p. 191).

Treatment

- Counsel caregivers to provide supportive care at home (Counselling box 22) and on management of fever and pain with paracetamol and ibuprofen (Counselling box 25, p. 230).

Counselling box 22. Home treatment of cough

How to care for your child with cough at home

- Soothe the throat and relieve the cough with a safe remedy, such as a warm drink.
- Clear secretions from the child's nose before feeds with saline when nasal blockage causes respiratory distress.
- Give paracetamol or ibuprofen if your child has high fever (≥ 39 °C) that causes distress.
- Make sure your child drinks enough and give extra fluids or breast milk if there is fever. Small frequent drinks are more likely to be tolerated and less likely to be vomited.
- Return if your child is breathing fast, has difficulty in breathing, becomes sicker or is unable to drink or breastfeed.

6.1.2 Acute bronchitis

Acute bronchitis is the inflammation of the bronchi, which is usually caused by a virus during the cold season. It often develops following a common cold with a runny nose. The term acute tracheobronchitis is used when the trachea is prominently involved.

History

- Cough, runny nose, no or low-grade fever, sometimes body aches during the first 1 to 3 days
- This is followed by a persistent cough, which can become productive
- Chest pain exacerbated by cough (older children).

Examination

- Early findings include rhinitis and conjunctivitis
- Chest auscultation: coarse crackles and rhonchi, in some cases, wheezing
- No signs of other severe disease, such as fast breathing, respiratory distress (see below).

Investigations

- Normally not needed, if in doubt pulse oximetry to detect hypoxia

Treatment

Acute bronchitis is a self-limiting disease.

DO NOT give antitussive (cough suppressant) medicines

DO NOT give antibiotics routinely.

- ▶ Counsel caregivers to provide supportive care at home (Counselling box 22). In addition to the messages in the box remember to:
  - — Counsel to clear secretions from a young child's nose with saline if nasal blockage causes respiratory distress.
  - — Inform that cough can last for several weeks.

Follow-up

Re-evaluate after 2–3 days, or ask the caregivers to come back earlier if the child becomes sicker or is unable to drink.

6.1.3 Pneumonia

Pneumonia is a lower airway infection commonly caused by viruses or bacteria. The main bacterial pathogens are *Streptococcus pneumoniae*, *Haemophilus influenzae* type b, *Staphylococcus aureus* and *Streptococcus pyogenes*. Other causative bacteria are *Mycoplasma pneumoniae* and *Chlamydia pneumoniae*, causing "atypical pneumonia".

Diagnosis

Diagnosis is mainly based on symptoms and history. Symptoms may vary depending on age, disease severity and causative agent.

Clinical features and X-ray findings are not sufficient to determine reliably the cause of the disease (bacterium or virus).

History

- History of previous episodes
- Vaccination status (*Streptococcus pneumoniae*, *Haemophilus influenzae* type b)

Infants and young children:

- Fever
- Cough
- Irritability
- Vomiting, diarrhoea
- Inability to drink or breastfeed

Older children and adolescents:

- Fever
- Cough
- Abdominal pain of sudden onset
- Chest (pleuritic) pain.

Examination

- Fever
- Fast breathing
  - ≥ 60/min in newborns <2 months of age
  - ≥ 50/min in children 2–11 months of age
  - ≥ 40/min in children 1–5 years of age
  - For older children see Table 128 (p. 713)
- Chest wall indrawing
- Nasal flaring
- Grunting
- Auscultation: coarse crackles or pleural rub. Decreased sounds may be a sign of pleural effusion.

Note: atypical pneumonia is characterized by:

- Children ≥ 5 years of age
- Cough, fever and suggestive auscultation
- Absence of high fever and signs of severe pneumonia (Table 31).

Complications

Consider potential complications such as pleural effusion or empyema if:

- Reduced movement on affected side of chest
- Stony dullness to percussion (over the effusion)
- Air entry absent (over the effusion).

Investigations

- Pulse oximetry to detect hypoxia
- Chest X-ray is NOT indicated in children without signs of severe pneumonia.

Differential diagnosis

Consider bronchiolitis, wheeze and asthma or other diseases (Table 30, p. 180).

Treatment

- Give oral amoxicillin 30 mg/kg/dose 3 times a day for 5 to 7 days (see dosages in Annex 4).

Table 31. Classification of severity of pneumonia in children < 5 years

Signs or symptoms	Classification	Management
Cough or difficulty in breathing with: ■ Oxygen saturation < 90% on pulse oximetry or central cyanosis ■ Severe respiratory distress, e.g. grunting, very severe chest indrawing ■ Inability to drink, breastfeed or vomiting everything ■ Lethargy, convulsions or altered consciousness	**Severe pneumonia**	▶ Provide early oxygen therapy and refer to hospital.
■ Fast breathing: — ≥ 50/min in child aged 2–11 months — ≥ 40/min in child aged 1–5 years — Lower chest wall indrawing	**Pneumonia**	▶ Treatment, see below.
No signs of pneumonia or severe pneumonia	**No pneumonia** Consider common cold	**DO NOT** give antibiotics.

DO NOT give antibiotics if there is no fast breathing or other sign of pneumonia.

- ▶ In children < 5 years not vaccinated against *Haemophilus influenzae* type b or with influenza coinfection: oral amoxicillin-clavulanate (in a 8:1 fixed co-formulation) with amoxicillin 30 mg/kg/dose 3 times a day orally for 5 to 7 days.
- ▶ If beta-lactam allergy (see Annex 9):
  - — with type I hypersensitivity (anaphylaxis): oral azithromycin or clarithromycin;
  - — without type I hypersensitivity: oral cefuroxime axetil.
- ▶ If suspected atypical pneumonia: oral azithromycin 10 mg/kg/dose once a day for 3 days.

- In children with immunosuppression and chronic diseases such as cystic fibrosis, consider other causative pathogens and antibiotics.
- Give oxygen if oxygen saturation is:
  - — < 90% in a child with respiratory distress
  - — < 94% in a child with severe respiratory distress, lethargy, convulsions or altered consciousness.
- Address risk factors such as parental smoking, indoor pollution and malnutrition if present.
- Counsel caregivers to provide supportive care at home (Counselling box 23) and on management of fever and pain with paracetamol and ibuprofen (Counselling box 25, p. 230).

Counselling box 23. Home treatment of pneumonia

How to care for your child with pneumonia at home

- Give paracetamol or ibuprofen if your child has high fever (≥ 39 °C) that causes distress.
- Make sure your child drinks enough and give extra fluids or breast milk if there is fever. Small frequent drinks are more likely to be tolerated and less likely to be vomited.
- Keep your child in a semi-seated position if your child has trouble breathing.

DO NOT smoke around your child.

- Return after 2–3 days for re-evaluation or earlier if your child is breathing fast, has difficulty in breathing, becomes sicker or is unable to drink or breastfeed.

Referral

Refer children with severe pneumonia or suspicion of complications (pleural effusion, empyema or pneumothorax) to hospital. Before and during referral:

- Provide early oxygen therapy if there is any sign of severe pneumonia (Table 31).
- Consider giving the first dose of IV or IM ampicillin at 50 mg/kg/dose (see dosages in Annex 4) if referral is expected to be significantly delayed.

Follow-up

Reassess after 2–3 days, or ask the caregivers to come back earlier if the child becomes worse (Counselling box 23):

- If improvement: ask caregivers to complete course of antibiotics if started
- If no improvement: refer to hospital.

Assess if identified risk factors are being addressed.

6.1.4 COVID-19

Coronavirus disease 2019 (COVID-19) is caused by SARS-CoV-2, an emergent coronavirus. Transmission mainly occurs from symptomatic and asymptomatic people to others by close contact through respiratory droplets, by direct contact with infected persons or contaminated objects and surfaces, or by aerosols.

Most cases in infants and children are reported to be asymptomatic or of mild illness.

If you suspect COVID-19, apply infection prevention and control measures (see Annex A1.3).

History

- History of contact with COVID-19 patient
- Risk factors for severe COVID-19: chronic lung disease (asthma), obesity, cardiovascular disease or immunosuppression.

Signs and symptoms of COVID-19 vary:

- Fever
- Cough
- Nasal congestion
- Fatigue
- Anorexia
- Shortness of breath
- Myalgia
- Sore throat

- Headache
- Diarrhoea, nausea and vomiting
- Loss of smell or loss of taste (usually preceding the onset of respiratory symptoms)
- Neurological symptoms: dizziness, agitation, weakness, seizures, trouble with speech or vision, sensory loss, problems with balance.

Signs of severe or critical COVID-19:

- Signs of pneumonia or severe pneumonia (Table 31, p. 186)
- Sepsis or septic shock: prolonged capillary refill (> 2 s), hypotension, altered mental state, brady-/tachycardia, tachypnoea, mottled or cold skin or petechial or purpuric rash, oliguria.

Investigations

- Pulse oximetry to detect hypoxia
- Collect nasopharyngeal and oropharyngeal specimens for RT-PCR (preferred) or antigen testing
- Consider testing for other respiratory pathogens such as influenza virus depending on local epidemiology and symptoms
- Chest imaging is not routinely indicated.

Management

- All children with suspected or confirmed COVID-19 must be isolated at home to contain virus transmission.

DO NOT prescribe antibiotics unless there is clinical suspicion of a bacterial infection.

- Consider empirical antibiotic treatment for possible pneumonia in children < 5 years (p. 185).
- Counsel caregivers to provide supportive care at home (Counselling box 23, p. 187) and on infection prevention control measures at home (Counselling box 24, p. 190).
- Advise to return urgently for re-evaluation if child develops any of the following signs: difficulty in breathing, rapid breathing, blue lips or face, chest pain or pressure, confusion, inability to awaken/not interacting when awake, inability to drink or breastfeed, dehydration, light-headedness.

Follow-up

Provide home-based care and telemedicine (phone or email), if possible, to monitor children with moderate COVID-19 regularly for signs or symptoms of disease progression, especially those with potential risk factors for severe disease (e.g. underlying chronic condition such as asthma or immunosuppression, and young infants), until symptoms have completely resolved. If child's condition worsens or signs of severe or critical COVID-19 appear, refer to hospital.

Assess if the child can be discharged from isolation. Follow current national recommendations on home isolation.

Counselling box 24. Infection prevention control measures during home care of children with respiratory diseases

Preventing infection during home care of children with respiratory diseases, e.g. influenza, COVID-19

Follow these measures depending on the age of your child (avoid doing more harm than good):

- Ventilate shared spaces regularly.
- Vulnerable (elderly, babies and sick) household members should keep at a distance.
- Ideally, assign one person to take care of the sick child.
- When a distance of 2 metres cannot be maintained you and your child should wear a mask if possible (depending on the child's age). Avoid touching the mask during use. Change mask daily and if it gets wet or dirty from secretions.
- Wash hands regularly and dry them properly, including before putting on and after removing the mask, before and after cooking and eating, and after using the toilet.
- Cough or sneeze into a bent elbow or tissue. Immediately dispose of the tissue and perform hand hygiene.
- Avoid exposure to contaminated items, e.g. used tissues, toothbrushes, cutlery, glasses.
- Use dedicated linen and eating utensils for your child.
- Clean frequently touched surfaces.

Referral

Refer immediately to hospital all children with signs of severe or critical COVID-19. Stabilize and provide oxygen therapy, if needed.

Complications

Multisystem inflammatory syndrome temporally associated with COVID-19 in children and adolescents (MIS-C)

An acute presentation with a hyperinflammatory syndrome leading to multiorgan failure and shock has been described in children with COVID-19.

Preliminary WHO case definition:

Children and adolescents with fever ≥ 3 days **and** ≥ 2 of the following:

- Rash or bilateral nonpurulent conjunctivitis or mucocutaneous inflammation signs (mouth, hands or feet)
- Hypotension or shock
- Features of myocardial dysfunction, pericarditis, valvulitis, or coronary abnormalities
- Evidence of coagulopathy (PT, PTT, elevated D-dimers)
- Acute gastrointestinal problems (diarrhoea, vomiting or abdominal pain)

and elevated inflammation markers (ESR, CRP or procalcitonin);

and no other obvious microbial cause of inflammation (bacterial sepsis, staphylococcal or streptococcal shock syndromes);

and evidence of COVID-19 (RT-PCR, antigen test or serology positive), or likely contact with patients with COVID-19.

▶ **Refer immediately** to hospital all children with suspected multisystem inflammatory syndrome temporally associated with COVID-19.

6.1.5 Wheeze

Wheeze is a high-pitched whistling sound on expiration. It is caused by spasmodic narrowing of the distal airway. Wheezing can be a self-limited process or the presenting symptom of a significant respiratory disease. In the first 2 years of life, wheezing is commonly caused by acute viral respiratory infections such as bronchiolitis or coughs and colds (recurrent wheezing). After 2 years of age, it is mostly due to asthma (Table 32, p. 193).

History

- Previous episodes of wheeze
- Nocturnal or early morning shortness of breath, cough or wheeze
- Response to bronchodilators
- Asthma diagnosis or long-term treatment for asthma
- Family history of allergy or asthma.

Examination

- Wheezing on expiration
- Prolonged expiration
- Resonant percussion
- Hyperinflated chest
- Rhonchi on auscultation
- Shortness of breath at rest or on exertion
- Lower chest wall indrawing.

Investigations

- Pulse oximetry to detect hypoxia
- Response to rapid-acting bronchodilator:

If the cause of the wheeze is not clear or if fast breathing or chest indrawing: give salbutamol nebulized or by metered dose inhaler with spacer (p. 595) and assess response after 15 min for signs of improvement:

  — less respiratory distress (easier breathing)

  — reduced lower chest wall indrawing

  — improved air entry.

- Give a second dose and refer to hospital if the child still shows signs of hypoxia (central cyanosis, oxygen saturation ≤ 90%, unable to drink due to respiratory distress, severe lower chest wall indrawing) or has fast breathing.

Table 32. Differential diagnosis of wheeze

Diagnosis	In favour
Asthma (p. 587)	• History of recurrent episodes of shortness of breath or wheeze • Night cough or cough and wheeze with exercise • Hyperinflation of the chest • Prolonged expiration • Reduced air entry (if very severe, airway obstruction) • Good response to bronchodilators.
Bronchiolitis (p. 194)	• First episode of wheeze in a child aged < 2 years • Wheezing episode at time of seasonal bronchiolitis • Hyperinflation of the chest • Prolonged expiration • Reduced air entry (if very severe airway obstruction) • Poor or no response to bronchodilators • Apnoea in young infants (especially preterm).
Recurrent wheezing (p. 196)	• Wheeze always related to coughs and colds • No family or personal history of atopy • Prolonged expiration • Reduced air entry (if very severe airway obstruction) • Good response to bronchodilators • Usually less severe than wheeze associated with asthma.
Foreign body aspiration (p. 503)	• History of sudden choking • Wheeze may be unilateral • No response to bronchodilators • Sudden onset of stridor or respiratory distress • Focal areas of wheeze or reduced breath sounds.
Pneumonia (p. 184)	• Fever • Coarse crackles • Grunting.

Bronchiolitis

Bronchiolitis is a lower respiratory viral infection that is typically defined as the first episode of wheezing in a child younger than 24 months of age. It is characterized by airways obstruction and is most severe in young infants. It is commonly caused by respiratory syncytial virus (RSV) and occurs in annual epidemics. Secondary bacterial infection may occur, but is rare.

- Cold season
- Usually starts with symptoms of common cold: cough and/or runny nose, with or without fever, during the first 1 to 3 days. In younger infants RSV infection may first manifest as apnoea
- Followed by persistent cough and difficulty in breathing.

Examination

Typical features include:

- Difficulty in feeding, breastfeeding or drinking owing to respiratory distress
- Hyperinflation of the chest, with increased resonance to percussion
- Fast breathing
- Lower chest wall indrawing
- Nasal discharge, which can cause severe nasal obstruction
- Fine crackles and wheeze on chest auscultation. Wheeze is not relieved with rapid-acting bronchodilator (**note**: bronchodilator is NOT recommended for children < 6 months old).

RED FLAGS

- Oxygen saturation < 90% on pulse oximetry or central cyanosis
- Severe respiratory distress: gasping, grunting, very severe chest indrawing
- Apnoea or history of apnoea
- Inability to drink, breastfeed or vomiting everything
- Lethargy, convulsions or altered consciousness.

Investigations

- Pulse oximetry to detect hypoxia.

Treatment

Most children can be treated at home with supportive care.

DO NOT provide bronchodilators, glucocorticoids, leukotriene inhibitors or antitussive (cough suppressant) medicines.

DO NOT provide antibiotics routinely: only if the child has signs of pneumonia.

- Consider giving nebulized hypertonic saline solution to improve respiratory symptoms.
- Counsel caregivers to provide supportive care at home (Counselling box 22, p. 182). Explain the expected course of the disease (up to several weeks) and that no pharmacological treatment is useful. In addition to the messages in the box remember to counsel to:
  - Clear secretions from the child's nose before feeds with saline when nasal blockage causes respiratory distress.
  - Give paracetamol (not ibuprofen) if the child has high fever (≥ 39 °C) that causes distress (Counselling box 25, p. 230).

Referral

Refer children with any red flags to hospital. Before and during referral:

- Provide early oxygen to all children with severe respiratory distress, i.e. oxygen saturation < 90%, or oxygen saturation < 94% in children with another sign of severity.

Consider referral if:

- Very young infant (< 3 months)
- Associated comorbidities (e.g. congenital heart disease, neuromuscular disease)
- Social risk factors with possible lack of close monitoring during treatment.

Follow-up

- Re-evaluate after 2–3 days, or ask the caregivers to come back earlier if the child becomes sicker (signs as for severe pneumonia) or is unable to drink. If no improvement, refer to hospital.
- Infants may have cough and wheeze for several weeks or months. Provided they have no respiratory distress, fever or apnoea and are feeding well they do not need antibiotics.

(Recurrent) wheezing associated with common cold

The main cause of wheezing in children is a viral infection producing inflammation of the bronchi. Viral-induced wheezing is common in the first few years of life. The first episode in a child < 24 months may be bronchiolitis (p. 194). Most recurrent episodes in the first years of life are due to viral infections and will improve during school age, although some cases are later diagnosed with asthma (p. 587).

History

- Cold season
- No family or personal history of asthma, eczema, hay fever
- Cough and/or runny nose, with or without fever, during the first 1 to 3 days
- Followed by a persistent and frequent cough, and difficulty in breathing
- Well and asymptomatic between episodes.

Examination

- Prolonged expiration
- Fast breathing
- Chest wall indrawing
- Chest auscultation: wheezing throughout the lungs, which improves with bronchodilators
- Rhinitis, conjunctivitis.

If there are any of the following signs of severe illness, consider an alternative diagnosis (see differential diagnosis).

- Oxygen saturation < 94% on pulse oximetry or central cyanosis
- Severe respiratory distress: gasping, grunting, very severe chest indrawing
- Inability to drink, breastfeed or vomiting everything
- Lethargy, convulsions or altered consciousness.

Investigations

- Pulse oximetry to detect hypoxia.

Differential diagnosis

If there are any signs of severe illness, consider an alternative diagnosis. See Tables 30 (p. 180, cough), 32 (p. 193, wheeze), and 34 (p. 204, chronic cough).

Treatment

Most children can be treated at home.

DO NOT give antitussive (cough suppressant) medicines.

DO NOT give antibiotics routinely: only if the child has signs of pneumonia.

- Management of an acute episode of wheezing follows the same principles as the management of an asthma exacerbation (p. 590). Assess the severity of the episode and treat accordingly.
- Counsel caregivers to provide supportive care at home (Counselling box 22, p. 182). In addition to the messages in the box remember to counsel to clear secretions from the child's nose with saline before feeds when nasal blockage causes respiratory distress.
- For recurrent episodes (not during the acute phase), provide inhaled glucocorticoids (see dosages in Annex 4).

Referral

Consider referral to a specialist if you suspect another diagnosis, e.g. gastroesophageal reflux, cystic fibrosis, immunodeficiency.

Follow-up

Re-evaluate after 2–3 days, or ask the caregivers to come back earlier if the child becomes sicker or is unable to drink. If improvement, decrease the frequency of bronchodilators. Assess the need for inhaled glucocorticoids as controller medication.

6.1.6 Stridor

Stridor is a harsh noise during inspiration, which is due to narrowing of the air passages in the oropharynx, subglottis or trachea. If the obstruction is below the larynx, stridor may also occur during expiration.

The main causes of severe stridor are viral croup (parainfluenza or other viruses), foreign body inhalation or rarely epiglottitis or a retropharyngeal abscess (Table 33). It may also occur in early infancy due to congenital abnormalities.

Table 33. Differential diagnosis of stridor

Diagnosis	In favour
Viral croup (p. 199)	• Barking cough • Respiratory distress • Hoarse voice.
Foreign body aspiration (p. 503)	• History of sudden onset of choking • Respiratory distress.
Allergic croup; anaphylaxis (p. 731)	• History of allergen exposure • Wheeze • Shock • Urticaria and oedema of lips and face.
Laryngo-tracheomalacia (p. 160)	• Symptoms present from birth • Noisy breathing when crying or eating, or during upper airway infections • Inspiratory or expiratory chest wall indrawing.
Burns (p. 492)	• Swollen lips • Smoke inhalation.
Retropharyngeal abscess (p. 200)	• Soft tissue swelling at back of the throat • Difficulty in swallowing • Fever.
Diphtheria (p. 201)	• Bull neck appearance due to enlarged cervical nodes and oedema • Red throat • Grey pharyngeal membrane • Blood-stained nasal discharge • No evidence of DTP vaccination.
Epiglottitis (p. 202)	• Soft stridor • "Septic" child • Little or no cough • Drooling of saliva • Inability to drink • Absence of Hib vaccination.

History

- First episode or recurrent episode of stridor
- History of choking
- Stridor present soon after birth.

Viral croup

Croup is inflammation of the upper airway, larynx and trachea usually triggered by a virus (most commonly parainfluenza virus). Viral croup is most common between the ages of 6 months and 6 years. When severe, croup can be life-threatening. Most severe episodes occur in children aged 2 years or below.

Diagnosis

Avoid unnecessary examination that may distress or harm the child, as this may worsen the child's condition.

Mild croup is characterized by:

- Fever
- Hoarse voice
- Barking or hacking cough
- Stridor that is heard only when the child is agitated.

Severe croup is characterized additionally by:

- Stridor even when the child is at rest
- Rapid breathing and lower chest indrawing
- Cyanosis or oxygen saturation < 90%.

Treatment

Mild croup can be managed at home.

DO NOT give antibiotics.

DO NOT give sedatives or antitussive (cough suppressant) medicines.

- Give oral dexamethasone 0.15 mg/kg, as a single dose or prednisolone 1 mg/kg twice a day for 3 days. Start the steroids as soon as possible. Repeat the dose for children who vomit.
- Counsel caregivers to provide supportive care at home (Counselling box 22, p. 182). In addition to the messages in the box remember to counsel to:

- Keep the child calm. Avoid disturbance as much as possible.
- Return after 24 hours for re-evaluation or earlier if the child becomes sicker or presents any sign of severe croup: stridor when at rest, rapid breathing or lower chest indrawing.

Follow-up

Re-evaluate children with mild croup within 24 hours, or ask the caregivers to come back earlier if the child becomes sicker (signs of severe croup).

Referral

Refer children with **severe croup** to the hospital. Before and during referral give:

- Oral dexamethasone 0.6 mg/kg, single dose. Repeat the dose for children who vomit.
- Nebulized epinephrine (adrenaline) (0.5 mL/kg 1:1000 solution, maximum 5 mL/dose). If this is effective and referral is delayed: repeat as often as every hour and carefully monitor the child's condition, especially the respiratory status, every 2–3 hours, until stable. While this treatment can lead to improvement within 30 min, it is often temporary and may last only about 2 h.
- Oxygen to maintain oxygen saturation > 94%.

Retropharyngeal abscess

Retropharyngeal abscesses consist of a deep infection in the neck with soft tissue swelling at the back of the throat. They are uncommon in children but potentially very serious.

Signs and symptoms

At an early stage, it may be difficult to distinguish from an uncomplicated tonsillitis. Diagnosis is based on a lateral neck X-ray, which will normally not be done in a first-level facility, so will need referral. As the disease progresses, signs of inflammation and upper airway obstruction develop:

- Difficulty in swallowing, pain on swallowing
- Hoarse voice
- Drooling
- Neck stiffness

- Neck swelling
- Respiratory distress with stridor and fast breathing.

Treatment and referral

Refer to hospital urgently (p. 782). Before and during referral:

- Consider giving the first dose of antibiotics (IV amoxicillin-clavulanate at 50 mg/kg/dose amoxicillin, see dosages in Annex 4) if referral is expected to be significantly delayed.

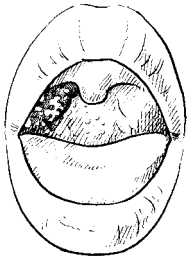
Diphtheria

Diphtheria is a serious bacterial infection, which has become uncommon thanks to effective immunization. Infection in the upper airway or nasopharynx produces a grey membrane which, when present in the larynx or trachea, can cause stridor or obstruction. Nasal involvement produces a bloody discharge. Diphtheria toxin causes muscular paralysis and myocarditis, which are associated with mortality.

Diagnosis

- Grey adherent pharyngeal membranes
- Bull neck appearance due to enlarged cervical nodes and oedema
- No evidence of DTP vaccination.

Note: carefully examine the throat, as the examination itself may cause complete obstruction of the airway.



Pharyngeal membrane of diphtheria. Note: the membrane extends beyond the tonsils and covers the adjacent pharyngeal wall.

Treatment and referral

Refer to hospital urgently (p. 782). Before and during referral:

- Keep the child calm. Avoid giving oxygen unless there is incipient airway obstruction.

Epiglottitis

Epiglottitis is a medical emergency that may result in death if not treated quickly. It is usually caused by *Haemophilus influenzae* type b, and has become very rare thanks to effective immunization. It usually begins as an inflammation and swelling between the base of the tongue and the epiglottis. The swelling may obstruct the airway.

Diagnosis

- Sore throat with difficulty in speaking
- Difficulty in breathing
- Little or no cough
- Soft stridor
- Fever
- Drooling of saliva
- Difficulty in swallowing or inability to drink.

Treatment and referral

Refer to hospital urgently (p. 782). Before and during referral:

- Keep the child calm. Provide oxygen with close monitoring if tolerated. Do not upset the child.

6.1.7 Chronic cough

A chronic cough is one that lasts ≥ 14 days without improving. Many conditions may present with a chronic cough (Table 34).

Some diseases such as bronchiolitis can be slow to resolve and may present with a cough lasting longer than 14 days; symptoms will have improved, and the child is not sick, so this is not considered chronic cough.

History

- Duration of coughing
- Nocturnal cough
- Paroxysmal cough or associated severe bouts ending with vomiting or whooping
- Night sweats
- Persistent fever

- Close contact with a person with sputum-positive TB or pertussis
- History of attacks of wheeze
- Family history of allergy or asthma
- History of choking or inhalation of a foreign body (can also present as an acute cough)
- Child suspected or known to be HIV-infected
- Treatment given and response
- Vaccination history.

Examination

- Fever
- Lymphadenopathy (generalized and localized, e.g. in the neck)
- Wheeze or prolonged expiration
- Clubbing
- Apnoeic episodes (with pertussis)
- Subconjunctival haemorrhages
- Signs of foreign body aspiration:
  - Unilateral wheeze
  - Area of decreased breath sounds is either dull or hyperresonant on percussion
  - Deviation of the trachea or apex beat
- Signs associated with HIV infection (p. 623)
- Weight loss or failure to thrive (check Growth chart (Annex 3), if available).

Table 34. Differential diagnosis of chronic cough

Diagnosis	In favour
Asthma (p. 587)	• Recurrent episodes of shortness of breath or wheeze • Night cough or cough and wheeze with exercise • Hyperinflation of the chest • Prolonged expiration, reduced air entry • Good response to bronchodilators • Positive spirometry.
Pertussis (p. 206)	• History of paroxysms of cough followed by a whoop, vomiting, cyanosis or apnoea • No symptoms between bouts of cough • Subconjunctival haemorrhages • History of no or incomplete DPT vaccination • No fever.
Gastro-esophageal reflux disease (p. 306)	• Infant • Effortless vomiting after feeding • May be irritable with back arching • Sometimes failure to thrive.
Smoking or other toxic irritants	• Adolescents • History of smoking or exposure to other toxic irritants.
Psychogenic (p. 557)	• Older children and adolescents • Dry cough during the day, no cough while asleep • No underlying organic cause or medical diagnosis.
Tuberculosis (p. 631)	• Weight loss or failure to thrive • Night sweats • Enlarged lymph nodes, liver and spleen • Chronic or intermittent fever • History of exposure to infectious TB • Abnormal chest X-ray.
Cystic fibrosis (p. 598)	• Persistent cough, sometimes starting shortly after birth • Recurrent chest infections • Recurrent sinus infections, nasal polyps • Failure to thrive, loose greasy stools.

Diagnosis	In favour
Congenital heart disease (p. 584)	• Cardiac murmur • Cyanosis • Failure to thrive • Tachycardia • Fast breathing • Enlarged liver.
Foreign body aspiration (p. 503)	• History of sudden onset of choking or stridor during eating or play • Unilateral wheeze or hyperinflation • Lobar consolidation or atelectasis on X-ray • Poor response to medical treatment.
Immune deficiency including HIV (p. 623)	• Recurrent or chronic fever, recurrent infections • Failure to thrive • Oral or oesophageal thrush • Herpes zoster (past or present) • Generalized lymphadenopathy • Persistent diarrhoea • Known or suspected maternal or sibling HIV infection.
Less common conditions. Refer for further investigations to confirm the suspected diagnosis.	
Broncho-pulmonary dysplasia	• History of preterm birth; very low birth weight • Needed prolonged mechanical ventilation or oxygen • Difficulty with breathing present from birth.
Bronchiectasis and lung abscess	• History of severe pneumonia, TB or aspirated foreign body • Poor weight gain • Purulent sputum, bad breath • Finger clubbing • Localized signs on X-ray.
Primary ciliary dyskinesia	• Recurrent chest infections • Chronic ear infections and persistent nasal discharge from birth • Situs inversus (50% of children).

Pertussis

Pertussis is most severe in young infants who have not yet been immunized. After an incubation period of 7–10 days, the child develops fever, usually with a cough and nasal discharge that are clinically indistinguishable from the common cough and cold. In the second week, there is paroxysmal coughing that can be recognized as pertussis. The child is infectious for up to 3 weeks after the onset of bouts of whooping cough.

History

- Severe cough for more than 2 weeks
- Disease is known to be occurring locally
- Not fully vaccinated against pertussis.

Examination

- Paroxysmal coughing followed by a whoop when breathing in, often with post-tussive vomiting
- Young infants may not whoop; instead, the cough may be followed by suspension of breathing (apnoea) or cyanosis, or apnoea may occur without coughing
- Subconjunctival haemorrhages.

Avoid, if possible, any procedure that could trigger coughing, such as throat examination.

Treatment

Treat mild cases in children aged ≥ 6 months at home with supportive care.

- Give oral erythromycin 12.5 mg/kg four times a day for 10 days or azithromycin 10 mg/kg (max. 500 mg) on the first day, then 5 mg/kg (max. 250 mg) once a day for 4 days.
- If signs of pneumonia or fever, treat with amoxicillin as a possible secondary pneumonia.

DO NOT give cough suppressants, sedatives, mucolytic agents or antihistamines.

- Counsel caregivers to provide supportive care at home (Counselling box 22, p. 182). In addition to the messages in the box remember to counsel to:
  - — Avoid as far as possible, anything that could trigger coughing, such as cleaning the nose secretions unnecessarily.
  - — Episodes of coughing can continue for 3 months or longer.

Prevention

- Give DPT vaccine to any child who is not fully immunized and to the child with pertussis.
- Give a DPT booster to previously vaccinated children.
- Give erythromycin estolate 12.5 mg/kg four times a day for 10 days to any infant in the family who is < 6 months old and has fever or other signs of a respiratory infection. In newborn < 1 month, give azithromycin 10mg/kg once daily for 5 days.

Referral

Refer to hospital:

- Infants aged < 6 months
- Any child with pneumonia, convulsions, dehydration or prolonged apnoea or cyanosis after coughing.

6.2 Ear, nose or throat problems

Ear, nose and throat (ENT) conditions such as otitis media and tonsillitis are particularly common in young children while sinusitis is more common in older children and adolescents. Viral infections are the most common causes of ENT symptoms although bacterial infection should be excluded.

6.2.1 Otalgia (ear pain)

Otalgia is a common symptom in children. The most common cause is acute otitis media, followed by otitis externa. In most cases, the diagnosis can be established by a thorough history and careful examination of the ear.

Otitis externa

Acute external otitis, also known as swimmer's ear, is a diffuse inflammation of the external ear canal that can spread to the auricular pavilion or the tympanic membrane. Acute bacterial infection is the most common cause of otitis externa; the most common pathogens are *Staphylococcus aureus* and *Pseudomonas aeruginosa*. The most serious cases can constitute a true cellulitis. It has a peak incidence between 7 and 12 years, and is more frequent in summer.

History

- Sudden onset of symptoms
- Ear pain (often very intense), itching or feeling of fullness in the ear, with or without hearing loss or pain with chewing
- Usually unilateral, although up to 10% of cases are bilateral.

Examination

- Pain accentuated by pulling the pinna and/or pressing the tragus
- Signs of inflammation of the external ear canal: diffuse oedema, erythema or both, with or without otorrhoea (secretions)
- In severe cases: regional lymphadenitis, erythema of the ear drum, cellulitis of the adjacent skin, and fever.

Differential diagnosis

It must be differentiated from ear furuncle, acute otitis media (p. 210), foreign body in the external canal (p. 502), acute mastoiditis (p. 214), contact dermatitis (p. 396), cellulitis (p. 394) and trauma.

Complications

Otomycosis, malignant otitis externa.

Treatment

- Give topical drops with antibiotics (such as ciprofloxacin) or antiseptics (such as acetic acid), with or without corticosteroids (p. 846).
- If there is involvement of the soft tissues (cellulitis), give oral antibiotics active against *Staphylococcus aureus* (cefadroxil, cloxacillin, amoxicillin-clavulanate; see dosages in Annex 4) for 7 days in combination with topical treatment.
- Counsel caregivers to provide supportive care at home:
  - — The child should not go swimming or get water in the ear.
  - — Give paracetamol or ibuprofen for pain relief (Counselling box 25, p. 230).
  - — Return if the child's condition worsens or does not improve after 48 to 72 hours.

Acute otitis media

Acute otitis media is a self-limiting infection of the middle ear mucosa, mostly in combination with a common cold. Most cases are viral infections.

History

Acute otitis media typically presents during or after a common cold and can present with any of the following symptoms:

- Fever
- Ear pain
- Pus draining from the ear (for < 2 weeks)
- Irritability in young children.

Examination

An accurate diagnosis of acute otitis media requires **otoscopy**:

- Red eardrum, inflamed, bulging and opaque, or perforated with discharge.

Many crying or febrile children will have red ear drums as part of a viral upper respiratory tract infection that does not require antibiotic treatment.

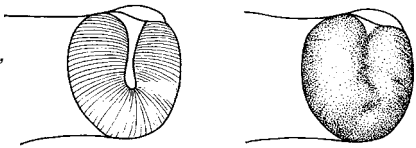
Complications

Rare but severe: cholesteatoma, mastoiditis (p. 214), meningitis (p. 235), intracranial abscess, sinus thrombosis, facial nerve palsy.

Treatment

Most children will improve within 3 days without antibiotics.

Treatment is largely supportive with antipyretics/analgesics/anti-inflammatory treatment given regularly.

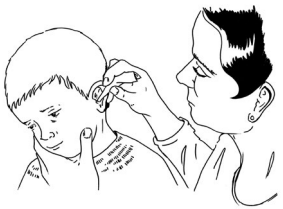


Acute otitis media: bulging, red eardrum (on right) and normal eardrum (on left)

- Give antibiotics if:
  - Children < 6 months
  - Children 6–23 months with bilateral acute otitis media
  - Marked pus draining (not due to otitis externa)
  - Fever > 39 °C or intense ear pain for at least 48 hours, sick appearance
  - Presence or high risk of serious illness (immunosuppression, cystic fibrosis) and/or complications
  - Recurrent acute otitis media (at least 3 episodes in the last 6 months or at least 4 episodes in the last 12 months).
- Give oral amoxicillin 30 mg/kg/dose three times a day.
- In children < 6 months, severe acute otitis media in children 6–23 months, recurrent acute otitis media, prior treatment failure with amoxicillin, prior treatment with amoxicillin in the last month or after 48–72 hours of treatment failure with amoxicillin, give oral amoxicillin-clavulanate or cefuroxime axetil. See dosages in Annex 4.
- Duration of treatment: 10 days in children < 6 months; 7–10 days in children 6–23 months, 5–7 days in children ≥ 2 years.
- If allergic to beta-lactams (see Annex 9):
  - with type I hypersensitivity (anaphylaxis): oral clarithromycin or azithromycin
  - without type I hypersensitivity: oral cefuroxime axetil.
- Counsel caregivers to provide supportive care at home:
  - The child should not go swimming or get water in the ear.
  - Give paracetamol or ibuprofen regularly for pain relief on the first 2 days (pain is common and can be very severe).
  - If pus is draining from the ear, wick the ear three times daily until there is no more pus.

    DO NOT apply heat or cold.

    DO NOT instil any substances like oils or herbal extracts.
  - Return if the child worsens or fails to improve after 2–3 days.



Follow-up

Re-evaluate after 2–3 days or earlier if the child becomes sicker. If the child's condition worsens or fails to improve, start or switch antibiotics (see above).

If ear pain or discharge persists, treat for 5 more days with the same antibiotic and advise to continue wicking the ear. Follow up in 5–7 days.

Referral

Refer immediately to hospital if acute otitis media is associated with a severe systemic infection or with acute complications (mastoiditis, meningitis, intracranial abscess, sinus thrombosis, facial nerve palsy).

Otitis media with effusion

Otitis media with effusion (serous otitis or glue ear) is defined as fluid in the middle ear without acute signs and symptoms of infection. It usually resolves spontaneously within 6 weeks, with no long-term effects on language, literacy or cognitive development.

History

- Hearing loss
- Feeling of fullness in the ear
- Tinnitus
- Balance problems.

Examination

- Otoscopy to confirm the presence of middle ear effusion (fluid behind the eardrum in the middle ear) with no signs of infection.

Treatment

Most cases occur after an episode of acute otitis media and resolve spontaneously.

DO NOT give antibiotics, oral or intranasal glucocorticoids, antihistamines or decongestants.

Referral

Refer children with persistent effusion beyond 3 months to the ENT specialist for hearing assessment and further management.

Chronic otitis media

Chronic otitis media, also known as chronic suppurative otitis media, is chronic inflammation and infection of the middle ear.

History

- Pus draining from the ear through a perforated tympanic membrane for > 2 weeks
- Hearing loss is often associated and can cause problems with language development in young children.

Examination

- Otoscopy to confirm chronic otitis media.

Treatment

▶ Give topical antibiotic drops containing ciprofloxacin with or without steroids (fluocinolone) twice a day for 2 weeks.

DO NOT give topical antiseptics.

▶ Counsel caregivers to provide supportive care at home:

— The child should not go swimming or get water in the ear.

— Keep the ear dry by wicking three times daily until there is no more pus.

DO NOT instil any substances like oils and herbal extracts, other than the prescribed antibiotic drops.

DO NOT apply heat or cold.

— Return after 5–7 days.

Follow-up

Re-evaluation after 5–7 days. If the ear discharge persists:

- Check that the caregiver is continuing to wick the ear.

DO NOT give repeated courses of oral antibiotics for a draining ear.

- Consider other causative organisms like Pseudomonas or tuberculous infection.
- Refer the child to an ENT specialist or hospital for further examinations and eventual parenteral treatment.

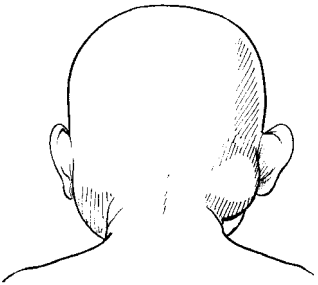
6.2.2 Mastoiditis

Mastoiditis is a rare but serious bacterial infection of the mastoid bone behind the ear usually as a complication of acute or chronic otitis media. Without treatment it can lead to meningitis and brain abscess.

Diagnosis

Based on clinical presentation:

- High fever
- Acute otitis media
- Tender swelling behind the ear leading to protrusion of the pinna.



Mastoiditis: a tender swelling behind the ear which pushes the ear forward

Treatment and referral

Refer immediately to hospital for IV antibiotics and potential ENT surgical review. Before referral:

- Consider giving the first dose of antibiotics IV or IM (cloxacillin, flucloxacillin or ceftriaxone) if referral is expected to be significantly delayed.
- Give paracetamol or ibuprofen if the child has pain or high fever (≥ 39 °C) that is causing distress (p. 230).

6.2.3 Sore throat

Tonsillitis

Sore throat is common in children. The commonest cause of sore throat in children is tonsillitis, or tonsillopharyngitis, which is an infection of the tonsils and pharynx. Most cases are viral infections.

The major bacterial cause is *Streptococcus pyogenes* (Group A streptococcal pharyngitis), which typically occurs at 5–15 years of age and is uncommon under 3 years of age. Other bacterial causes are rare. Tonsillitis due to Group A streptococcal infection predisposes to acute rheumatic fever (p. 241).

Signs and symptoms

Look for:

- Symptoms and signs suggestive of bacterial or viral infection (Table 35)
- Presence of pus on the tonsils (viral or bacterial)
- Signs of unilateral tonsillar swelling (peritonsillar abscess)
- Signs of airway obstruction
  - — Inability to open the mouth
  - — Drooling
  - — Stridor
- Signs that may indicate a retropharyngeal abscess, other severe complications or other diseases (e.g. croup, epiglottitis):
  - — Torticollis
  - — Trismus
  - — Facial swelling below the mandible.

If there are signs of upper airway obstruction great care is needed when examining the throat, as the examination may cause complete obstruction of the airway.

Clinical features alone DO NOT allow differentiation between bacterial and viral infections.

Investigations

- Investigations are not required in children < 3 years with symptoms of viral infection
- Rapid streptococcal antigen detection test in:
  - — Children ≥ 3 years with symptoms suggestive of bacterial infection.
  - — Children < 3 years with history of close contact with a person with confirmed streptococcal infection, or with symptoms of streptococcal infection such as a scarlatiniform rash.
- Consider throat swab for culture, if suspected bacterial infection in children ≥ 3 years.

DO NOT perform a rapid diagnostic test if there is any sign of upper airway obstruction.

Table 35. Symptoms and signs suggestive of tonsillitis of bacterial or viral origin

	Bacterial infection	Viral infection
History	• ≥ 3 years old • Sudden onset sore throat • Pain on swallowing • Voice changes, noisy breathing • History of acute rheumatic fever	• < 3 years old • Cough, runny nose • Conjunctivitis • Characteristic viral exanthem • Diarrhoea.
Throat examination	• Petechiae on tonsils and soft palate (streptococcal infection) • Thick greyish membrane covering throat and tonsils (diphtheria)	• Vesicles or white spots on palate and throat • Tonsils covered with grey-white patches (Epstein-Barr virus, infectious mononucleosis, p. 251).
Enlarged lymph nodes	• Single tender anterior cervical	• Multiple lymph nodes enlarged.
Rash	• Scarlatiniform rash: sandpaper rash, starting at the neck and spreading to trunk and extremities (p. 248)	• Unspecific or specific viral rash (p.244)

Differential diagnosis

A child presenting with recurrent episodes of tonsillitis at regular intervals may have periodic fever with aphthous stomatitis, pharyngitis and adenitis (PFAPA) syndrome.

Treatment

- Manage acute airway obstruction immediately, if present.
- Most cases are viral infections and do not require antibiotics.
- Prescribe antibiotics (see dosages in Annex 4) in children with symptoms of bacterial infection (see above) **and** a positive rapid streptococcal test:

• Oral phenoxymethylpenicillin (penicillin V) 125 mg in children < 1 year, 250 mg in children 1–5 years, 500 mg in children 6–12 years in 2 daily

doses or oral amoxicillin at 50 mg/kg/day in 1 or 2 daily doses for 10 days.

- If allergic to penicillin:
  - — With type I hypersensitivity (anaphylaxis): oral erythromycin or another macrolide for 10 days. DO NOT use azithromycin.
  - — Without type I hypersensitivity: oral cefadroxil or cephalexin for 10 days.
- If oral intolerance or suspicion of therapeutic non-compliance: IM benzathine penicillin (penicillin G) 0.6 million U for children < 30 kg, 1.2 million U for children > 30 kg, single dose.

▶ Counsel caregivers to provide supportive care at home:

- — Give paracetamol or ibuprofen if the child has pain or high fever (≥ 39 °C) that causes distress (Counselling box 25, p. 230)
- — Make sure the child drinks enough
- — Return if the child worsens or fails to improve after 2–3 days.

Referral

Refer to hospital children in severe pain, unable to drink, with dehydration, unable to open mouth, with airway obstruction or with signs of peritonsillar abscess or diphtheria.

6.2.4 Nasal discharge

Sinusitis

Sinusitis is an inflammation of the mucosal lining of the paranasal sinuses, which can be acute or chronic.

Acute sinusitis (rhinosinusitis) is a self-limiting condition usually triggered by a viral upper respiratory tract infection such as the common cold. Occasionally, acute sinusitis may become complicated by a bacterial infection. Blocked sinuses can also be caused by hay fever or nasal polyps p. 221.

Chronic sinusitis (> 90 days of persistent symptoms) may be related to other conditions such as allergy (allergy testing), cystic fibrosis, gastroesophageal reflux or exposure to environmental pollutants (i.e. tobacco smoke).

Sinuses develop at different ages: the maxillary and ethmoidal sinuses from birth, sphenoid sinus by 3–7 years of age and frontal sinus by 7–12 years of age.

History

- Symptoms of nasal blockage or congestion
- Purulent nasal discharge
- Halitosis (bad smell out of the nose)
- Dental or facial pain on pressure
- Headache
- Pain in the affected sinus on bending over to touch the toes
- Reduced or loss of smell.

Examination

- Facial tenderness on percussion over affected sinus
- Foul nasal discharge.

Differential diagnosis

- Nasal foreign body if unilateral purulent nasal discharge: rule out by local inspection (anterior rhinoscopy)
- Nasal septal deformities, adenoid hypertrophy, masses or polyps in complicated cases (p. 219).

Treatment

▶ Give nasal budesonide for 14 days.

DO NOT give decongestants, antihistamines and systemic corticosteroids.

▶ Give antibiotics if:

  — Systemically very unwell

  — Symptoms and signs of serious illness and/or complications

  — High risk of complications, e.g. immunosuppression, cystic fibrosis.

- Give oral amoxicillin 30 mg/kg/dose three times a day for 7–10 days.
- In children < 2 years, if severe or prolonged (> 30 days) infection or after 48–72 hours of treatment failure with amoxicillin: oral amoxicillin-clavulanate or cefuroxime axetil (see dosages in Annex 4).
- If allergic to beta-lactams (see Annex 9):

  — With type I hypersensitivity (anaphylaxis): oral clarithromycin or azithromycin

  — Without type I hypersensitivity: oral cefuroxime axetil.

- Counsel caregivers on providing supportive care at home:
  - Clear the nose with nasal saline to relieve nasal congestion
  - Give ibuprofen (preferable) or paracetamol if the child has pain or high fever (≥ 39 °C) that causes distress (Counselling box 25, p. 230).
  - Symptoms usually improve within 2 to 3 weeks without antibiotics
  - Return if the child does not improve after 2–3 weeks (if no antibiotics are started) or after 2–3 days (if antibiotics are started). Return earlier if the child worsens.

Referral

Refer to hospital if systemically very unwell, with intraorbital or periorbital complications, or intracranial complications.

6.2.5 Nasal obstruction

Nasal obstruction is a common complaint and may be due to several causes (Table 36). The diagnosis is mainly based on a detailed history and physical examination. Perform anterior rhinoscopy where needed.

Table 36. Differential diagnosis of nasal obstruction

Diagnosis	In favour
Adenoid hypertrophy (p. 220)	• Mouth breathing • Snoring may be associated with sleep-disordered breathing • Recurrent acute otitis media.
Rhinitis	• History of atopy • Nasal discharge.
Sinusitis (p. 217)	• Nasal obstruction and/or purulent nasal discharge • Halitosis • Dental or facial pain on pressure.
Foreign body in nose (p. 502)	• Young child • Usually unilateral nasal obstruction.
Nasal septal deviation (p. 221)	• History of facial/nasal trauma or previous nasal surgery.
Nasal polyps (p. 221)	• Family history of polyposis • Associated with cystic fibrosis, chronic sinusitis or rhinosinusitis.

Adenoid hypertrophy

Adenoid hypertrophy or enlargement is a common cause of nasal obstruction in children, causing difficulty in nasal breathing. It can be due to viral or bacterial infections, and to non-infectious causes.

Signs and symptoms

- Mouth breathing
- Mucopurulent nasal discharge
- Snoring can be associated with sleep-disordered breathing (p. 551).
- "Adenoid facies" (due to long-term mouth breathing): open mouth, long midface, narrow nose, shortened upper lip, narrow palate, dental crowding.

Examination

Perform anterior rhinoscopy to assess the adenoids and exclude other causes of nasal obstruction.

Investigations

X-ray is not required.

Treatment

Usually self-limited as the adenoids regress during later childhood and adolescence.

In the event of acute infection, treat as for tonsillitis (p. 214).

Referral

Refer to a specialist for evaluation, further investigations and potential elective adenoidectomy if adenoid facies, recurrent infectious episodes such as otitis media, hearing difficulties, or suspicion of sleep-disordered breathing.

Nasal septal deviation

Mild nasal septal deviations are common and usually asymptomatic. More pronounced nasal septal deviations can cause nasal obstruction.

History

- History of facial or nasal trauma or previous nasal surgery
- Mouth breathing
- Easier to breathe on one side of the nose
- Loud breathing, snoring during sleep
- Headache.

Examination

Inspect the nasal septum for visible nasal septal deviation.

Exclude nasal septal haematoma if history of trauma: fluctuant swelling in the nasal septum, usually bilateral (seen from both nostrils).

Treatment and referral

Most cases resolve spontaneously without any treatment.

- Refer urgently to hospital if suspected nasal septal haematoma.
- Refer to a specialist to assess for septoplasty if severe nasal septal deviation is causing distress to the child.

Nasal polyps

Nasal polyps are soft and painless growths from oedematous inflamed nasal mucosa. The most common causes of nasal polyposis in childhood are cystic fibrosis (p. 598) and chronic or recurrent sinusitis (p. 217).

History

- Mouth breathing, nasal speech
- Sometimes profuse unilateral mucoid rhinorrhoea
- Loud breathing, snoring during sleep.

Examination

Inspect the nasal cavity for glistening, pink-grey masses.

Polyps located posteriorly cannot be seen on anterior rhinoscopy.

Investigations

Identify the underlying cause.

Rule out cystic fibrosis (p. 598) in a child with nasal polyps.

Treatment and referral

- Give intranasal corticoid spray (e.g. budesonide, see p. 845).
- Refer to a specialist to confirm diagnosis and underlying cause if necessary.
- Refer to a specialist if complete nasal obstruction and/or uncontrolled rhinorrhoea for surgical removal.

6.2.6 Epistaxis (nose bleeding)

Epistaxis (nose bleeding) in children usually occurs in Little's area, which is an area rich in small vessels on the anterior septal wall. The bleeding is usually venous, of brief duration and often recurrent.

Epistaxis is uncommon in infants but increases with age, and most adolescents have had at least one episode of epistaxis.

Epistaxis is associated with:

- Minor trauma from nose picking, rubbing, sneezing, coughing or straining
- Dry nasal mucosa due to upper respiratory tract infection, allergic rhinitis, drying of mucosa, intranasal steroids
- Rarer causes: foreign bodies, nasal polyps, bleeding diatheses, vascular malformations and nasopharyngeal tumours.

History

- Recurrent or frequent episodes
- Easy bruising
- Foreign body (young children, nasal drainage on the side of the foreign body with bad odour)
- History of bleeding after surgical challenges, e.g. dental extractions, tonsillectomy, circumcision
- Family history of bleeding, menorrhagia, recurrent epistaxis
- Medication, e.g. nonsteroidal anti-inflammatory drugs, nasal sprays, nasal medication.

Treatment

- Assess for life-threatening bleeding and provide emergency management, if needed.
- Stop the nose bleeding (see picture).
- If dry, cracked mucosa is contributing to the problem, petroleum jelly should be applied until healing.
- For a nasal foreign body, see p. 502. for management.

Stopping nose bleeding
Ask the child to sit up in a comfortable position with the head facing down. Pinch the front part of the nose and apply continuous pressure for 10 minutes.

Referral

Refer children to an ENT specialist if bleeding cannot be controlled or with frequent recurrences.

6.3 Fever

Fever is defined by core (rectal, tympanic) temperature > 38 °C. Temperatures in this book are core temperatures, unless otherwise stated. Axillary temperatures are approximately 0.5 °C lower.

Fever is not a disease but the body's natural response to fighting infections like coughs and colds. Most cases of fever in children are nothing to worry about, but it is important to rule out life-threatening conditions.

Fever is a clinical sign not the diagnosis!

! Rule out life-threatening conditions (Table 37) and manage and refer immediately if needed.

History

Ask for:

- Drowsiness
- Stiff neck or neck pain
- Convulsions or seizures
- Headache
- Duration of fever
- Skin rash
- Pain on passing urine
- Abdominal pain
- Diarrhoea or vomiting
- Ear pain
- Loss of smell, loss of taste
- Recent contact with a person with an infectious disease
- Recent travelling
- Vaccination history
- Allergies
- Drugs.

Examination

Examine the whole body and look for the following signs:

- *General:* drowsiness, pallor or cyanosis, jaundice, lymphadenopathy
- *Head and neck:* bulging fontanelle, stiff neck, discharge from ear or red bulging eardrum on otoscopy, swelling or tenderness in mastoid region, mouth ulcers, enanthem, tongue appearance, Koplik spots, swollen or purulent tonsils
- *Chest:* fast breathing, heart murmur (note: a flow murmur is common in children with fever, see p. 326)
- *Abdomen*: enlarged spleen or liver, palpable mass, tenderness, abdominal, loin or suprapubic pain
- *Limbs:* difficulty in moving joint or limb; warm, swollen, red and tender joints
- *Skin rash:* pustules, signs of skin infection (red, warm, swollen, and tender), maculopapular rash, purpura, petechiae.

Table 37. Life-threatening conditions presenting with fever

Diagnosis	In favour
Meningitis (p. 235)	• Neck stiffness • Bulging fontanelle • Reduced level of consciousness • Headache • Convulsion(s).
Encephalitis	• Altered mental status • Focal neurological signs • Focal seizure • Reduced level of consciousness • Headache.
Sepsis (p. 736)	• Ill-looking (lethargic, pale, reduced interaction) with no apparent cause • Signs of shock: prolonged capillary refill time, hypothermia in a young infant • Purpura, petechiae (meningococcal disease) • Fast breathing.

Diagnosis	In favour
Severe pneumonia (p. 186)	• Grunting • Severe chest indrawing • Fast breathing • Cyanosis, oxygen saturation < 90%.
Myocarditis (p. 323)	• Tachycardia out of proportion to the degree of fever • Fever • Chest pain, respiratory distress • Signs of cardiogenic shock, arrhythmias, heart failure (dyspnoea, enlarged liver).
Pericarditis (p. 323)	• Retrosternal pain (worse when lying, improves when leaning forward) • Pericardial friction rub, tachycardia • Distant heart sounds.
Retro-pharyngeal abscess (p. 200)	• Sore throat, difficulty in swallowing, drooling of saliva, muffled voice, unable to speak • Tender cervical nodes • Airway obstruction: stridor, fast breathing.
Peritonitis (p. 758)	• Acute abdominal pain • Rigid abdomen that does not move with respiration • Tenderness on abdominal palpation • Decreased bowel sounds.
Severe dehydration (p. 282)	• Sunken eyes, slow return after pinching skin • Irritability, lethargy, reduced level of consciousness.
Heatstroke (sunstroke) (p. 740)	• History of sun exposure • Delirium, seizures, hallucinations, ataxia, dysarthria, coma • Tachycardia, tachypnoea • Vomiting, diarrhoea.
Multisystem inflammatory syndrome in children (MIS-C) (p. 191)	• Erythema, rash or oedema of hands or feet, oral mucositis • Conjunctivitis • Signs of heart dysfunction (e.g. pericarditis) • Acute gastrointestinal problems • History of COVID-19 contact or positive test.

Differential diagnosis

Consider duration and recurrence of fever, travel history, presence of localizing signs and rash in the differential diagnosis. In this section, fever is classified as:

- Fever lasting 7 days or less:
  - — Without localizing signs (Table 38, p. 231)
  - — With localizing signs (Table 39, p. 232)
- Fever with rash (Table 41, p. 244)
- Fever lasting longer than 7 days (Table 44, p. 258)
- Recurrent fever (Table 45, p. 267)
- Fever in the child coming from abroad (Table 46, p. 269).

Management of fever

Treat the child, not the thermometer!

DO NOT give empirical antibiotic treatment. Fever is not a reason by itself to give antibiotics.

Paracetamol and ibuprofen are the main drugs in children to lower the temperature and are comparably safe and effective.

- Restrict treatment with paracetamol or ibuprofen to children with fever who are uncomfortable or distressed due to high fever.
- Children who are alert and active are unlikely to benefit from antipyretic treatment.
- Use the lowest effective dose for the shortest period of time.
- Counsel caregivers on the management of fever at home (Counselling box 25, p. 230).

Paracetamol 10–15 mg/kg up to every 4–6 h (max. 60 mg/kg/day, or 4 g/day). Paracetamol is available in suppository form for rectal administration, which is useful in children with vomiting, reduced level of consciousness or seizures.

DO NOT give paracetamol to children with hepatic impairment or **active liver disease.**

Ibuprofen 5–10 mg/kg every 6–8 h (max. 40 mg/kg/day, or 2400 mg/day).

DO NOT give ibuprofen to children with gastrointestinal bleeding, severe dehydration or severe asthma, as ibuprofen can cause gastritis, bleeding disorders, bronchial obstruction and renal impairment.

Other agents: aspirin is not recommended as a first-line antipyretic due to the risk of Reye syndrome in younger children.

DO NOT give aspirin to children with chickenpox, dengue fever and other haemorrhagic disorders.

DO NOT give other agents (dipyrone, phenylbutazone) because of their toxicity or inefficacy.

6.3.1 Fever lasting 7 days or less

The main aim is to differentiate treatable infections with possible serious consequences from mild, self-resolving febrile illnesses.

History and examination

Take a detailed history and perform an examination (p. 225).

Investigations

Investigations are usually NOT necessary and can be misleading in children > 3 months with a clear cause of fever (i.e. common cold, cold, diarrhoea) and **no danger signs** (inability to drink/breastfeed, vomiting everything, lethargy, convulsions or altered consciousness). Young infants < 3 months with fever need to be assessed for serious bacterial infections (p. 170).

- Pulse oximetry if signs of difficulty in breathing.
- Urine dipstick if:
  - Young children with high fever or fever lasting > 24–48 hours with no focalizing signs or symptoms
  - Signs or symptoms of urinary tract infection (p. 356).
- Blood analysis with full blood count and C-reactive protein may help discriminate between bacterial and viral infections and guide decision-making on antibiotics.
- Other investigations depending on symptoms, e.g. urine microscopy and culture, blood culture, lumbar puncture for cerebrospinal fluid analysis. Some may require referral.

Counselling box 25. Management of fever at home

How to care for your child with fever at home

- Fever is not a disease but a mechanism of defence against infections.
- Give paracetamol or ibuprofen when your child has high fever (≥ 39 °C) that causes discomfort or pain:
- Ensure you give the correct dose* for your child:
  - Weight of child (kg): .....
  - Drug name: .....
  - Strength: .....
  - Maximum per day: .....
- Ensure that the strength of the medication corresponds to what has been prescribed.
- Paracetamol and ibuprofen are similarly effective in treating pain and reducing fever. Do not combine or alternate them.
- Use a thermometer to measure the fever if possible.
- If high fever, keep your child lightly clothed, in a warm but well-ventilated room.
- Make sure your child drinks more than usual to avoid dehydration.
- Return after 2–3 days if the fever persists.
- Return immediately if your child shows any of the following:
  - Unable to drink or breastfeed
  - Small dark red spots on the skin that do not disappear when the surrounding skin is stretched
  - Stiff neck
  - Convulsion, drowsy or loss of consciousness
  - Fast or difficult breathing.

Next time that your child has a fever:

- If there are no worrisome signs, follow the recommendations above. There is no need to seek urgent medical assistance.
- After 2–3 days of fever, or as soon as your child presents any worrisome signs, consult with your health care provider.
- If your child is < 3 months and has a fever, go to the doctor the same day.

* Please fill in the dosages for paracetamol and ibuprofen (p. 228 and Annex 4).

Differential diagnosis

Fever without localizing signs

Table 38. Differential diagnosis of fever without localizing signs

Diagnosis	In favour
Urinary tract infection (p. 356)	• Common cause of fever in young children • Urinary frequency or dysuria, bed-wetting when child has previously been dry at night. • Abdominal pain, loin or suprapubic tenderness • Vomiting, poor feeding • Lethargy, irritability
Fever as reaction to medications or vaccine	• History of recent medication intake or vaccination • Muscle pain • Sustained fever with no other symptoms • Resolution of fever within 72 hours of medication being stopped (up to 1 month for some medications).
Sepsis	See Table 37, p. 226: life-threatening conditions
Typhoid fever	• History of travel • Persistent fever • Constipation, vomiting, abdominal pain, tenderness, transient rash, enlarged liver or spleen • Adolescents can present with confusion.

Fever with localizing signs

Table 39. Differential diagnosis of fever with localizing signs

Diagnosis	In favour
Fever and cough, nasal discharge, difficulty in breathing	
Common cold (p. 181)	• Cough, runny nose • Good general appearance • No difficulty in breathing.
Rhinosinusitis (p. 217)	• Cough, headache • Foul nasal discharge • Facial pain and swelling, sore throat.
Pneumonia (p. 184)	• Cough • Fast breathing • Lower chest wall indrawing, grunting, nasal flaring.
Influenza (p. 237)	• Cough (usually dry, can be severe and last ≥ 2 weeks during influenza season) • Headache, muscle and joint pain, malaise • Sore throat, runny nose.
COVID-19 (p. 188)	• History of exposure (contact) to COVID-19 • Cough, fast breathing, lower chest wall indrawing • Loss of smell, loss of taste.
Fever and facial swelling	
Mumps (p. 238)	• Muscle pain, headache, malaise • Followed by swelling of the parotid gland(s).
Fever and ear pain	
Acute otitis media (p. 210)	• Bulging ear drum, middle ear effusion • Irritability in young children.
Mastoiditis (p. 214)	• Acute otitis media • Tender swelling and redness behind the ear leading to protrusion of the pinna.

Diagnosis	In favour
Fever and painful mouth or throat	
Tonsillitis (p. 214)	• Sore throat, pain on swallowing • Enlarged cervical lymph nodes • Petechiae, vesicles, membrane on tonsils.
Infectious mononucleosis (p. 251)	• Tonsillar pharyngitis • Malaise, severe fatigue, cervical adenopathy • Respiratory symptoms • Oedema, enlarged spleen and liver.
Herpetic gingivostomatitis (p. 239)	• Painful mouth ulcers (resembling aphthae) affecting tongue, gums and hard palate • Enlarged cervical and submandibular lymph nodes • Halitosis.
Herpangina (p. 240)	• Painful mouth ulcers affecting the posterior oral cavity, including the anterior pharyngeal folds, uvula, tonsils and soft palate.
Retropharyngeal abscess (p. 200)	See Table 37, p. 226: life-threatening conditions
Fever and diarrhoea or abdominal pain	
Gastroenteritis (p. 275)	• Diarrhoea • Vomiting • Abdominal cramping, abdominal pain.
Appendicitis	• Persistent pain and tenderness in the right lower quadrant • Nausea, low appetite, vomiting.
Hepatitis (p. 415)	• Abdominal pain • Tender right upper quadrant, enlarged liver • Jaundice with dark urine.

Diagnosis	In favour
Fever and joint or skin pain/swelling	
Septic arthritis (p. 421)	• Joint hot, tender, swollen • Pain on movement and at rest • Refusal to move affected limb or joint, or to bear weight on leg • Reduced range of movement.
Osteomyelitis (p. 422)	• Subacute onset • Local tenderness and swelling over the bone • Localized pain and pain on movement • Refusal to move affected limb or to bear weight on leg.
Skin and soft tissue infection (p. 394)	• Swollen and red skin, painful and warm to touch (cellulitis) • Boils and swellings • Pustules • Pyomyositis (purulent infection of muscles).
Acute rheumatic fever (p. 241)	• Migratory joint pain • Heart murmur, carditis • Subcutaneous nodules, erythema marginatum • Sydenham's chorea.
Fever and heart murmur	
Myocarditis (p. 323)	See Table 37 p. 226: life-threatening conditions
Pericarditis (p. 323)	
Acute rheumatic fever (p. 241)	See above
Fever and altered or reduced level of consciousness	
Meningitis (p. 235)	See Table 37 p. 226: life-threatening conditions
Encephalitis	
Heatstroke (p. 740)	

Meningitis

Bacterial meningitis is a serious illness that is responsible for considerable morbidity and mortality. No single clinical feature emerges as sufficiently distinctive to make a robust diagnosis, but a history of fever and seizures with the presence of meningeal signs and altered consciousness are common features. The possibility of viral encephalitis or tuberculous meningitis must be considered as differential diagnoses in children with meningeal signs.

Early diagnosis is essential for effective treatment.

History

- Convulsions
- Vomiting
- Inability to drink or breastfeed
- Headache or pain at back of neck
- Irritability
- Photophobia
- Recent head injury.

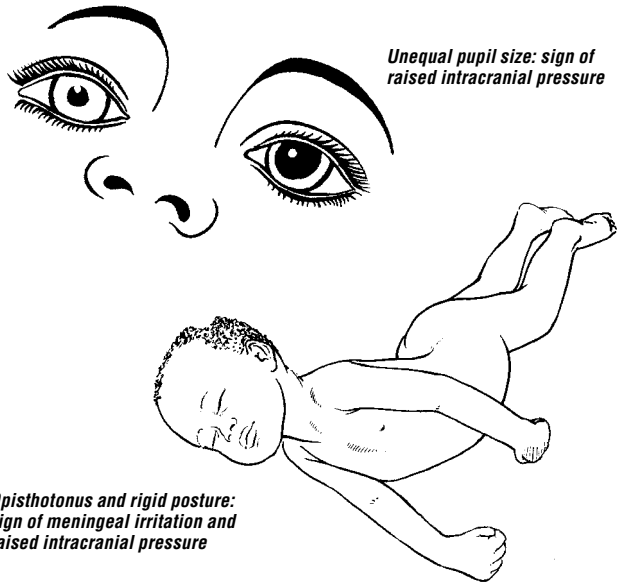
Looking and feeling for stiff neck in a child

Examination

- Altered level of consciousness
- Neck stiffness
- Repeated convulsions
- Bulging fontanelle in infants
- Lethargy
- Irritability
- Non-blanching petechial rash or purpura
- Focal paralysis in any limb
- Signs of head trauma suggesting possible recent skull fracture.

Any of the following signs of raised intracranial pressure:

- Decreased consciousness level
- Unequal pupil size
- Rigid posture or posturing



Unequal pupil size: sign of raised intracranial pressure

Opisthotonus and rigid posture: sign of meningeal irritation and raised intracranial pressure

- Irregular breathing
- Hypertension with brady- or tachycardia.

Treatment and referral

Refer the child immediately to hospital to confirm the diagnosis and further management.

- If referral is expected to be delayed, give the first dose of ceftriaxone 50 mg/kg IM as soon as possible.

Influenza

Influenza is an acute respiratory infection caused by influenza viruses. Influenza serotypes A and B cause seasonal epidemics. Seasonal influenza spreads easily through droplets or by hands contaminated with influenza viruses.

Diagnosis

Based on clinical presentation:

- Sudden onset of fever
- Cough (usually dry), can be severe and last ≥ 2 weeks
- Headache
- Muscle pain
- Joint pain
- Malaise
- Sore throat
- Runny nose.

Complications

- Laryngotracheitis, tracheitis
- Bacterial superinfection (*S. aureus*, *S. pneumoniae*)
- Pneumonia (p. 184)
- Respiratory failure.

Investigations

Consider rapid influenza diagnostic tests or influenza virus isolation or detection of influenza-specific RNA by RT-PCR from throat, nasal and nasopharyngeal secretions to confirm the diagnosis.

Treatment

▶ Counsel caregivers to provide supportive care for fever at home and when to return (Counselling box 25, p. 230) and on preventive measures during home care (Counselling box 24, p. 190).

Referral

Refer children with chronic conditions, with severe or progressive clinical illness associated with suspected or confirmed influenza virus infection and with complications to hospital for further treatment and monitoring.

Prevention

- Provide annual influenza vaccination to children between 6 months and 5 years and children with chronic conditions (p. 68). Check your country's specific vaccination schedules.

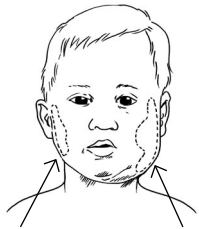
Mumps

Mumps is an acute disease caused by a paramyxovirus. Mumps virus is spread via direct contact or by airborne droplets. It is a self-limiting disease that usually resolves completely after about a week. Children with mumps are contagious from about 2 days before the onset of swelling of the parotid gland up to 9 days after the onset of swelling.

Diagnosis

Based on clinical presentation:

- Uni- or bilateral swelling of the parotid salivary gland(s)
- Swelling of other salivary glands (10%).
- Muscle pain
- Headache
- Malaise
- Low-grade fever



Normal size of parotid gland *Swelling of parotid gland*

Complications

- Orchitis (20% of postpubertal males; can cause impaired fertility)
- Mumps meningitis (15%), mumps encephalitis, sensorineural deafness
- Pancreatitis (4%).

Investigations

No laboratory investigations are required for uncomplicated forms.

Treatment

There is no specific therapy.

- Counsel caregivers on providing supportive care at home and when to return (Counselling box 25, p. 230) and on general preventive measures (Counselling box 24, p. 190).

Prevention

Vaccination is essential to prevent mumps (p. 68).

Herpetic gingivostomatitis

Gingivostomatitis is the most common affectation of herpes simplex virus in children. Primary infection typically occurs in children between 6 months and 5 years of age but can occur at any age. Transmission is caused by direct contact with infected secretions or lesions.

Diagnosis

Based on clinical presentation:

- Painful mouth ulcerations (resembling aphthae) affecting tongue, gums and hard palate, bleeding easily, leading to drooling and refusal to eat and drink
- Perioral vesicular lesions, which can spread to face and chin
- Enlarged lymph nodes (cervical and submandibular)
- Halitosis
- Fever, irritability, malaise, headache.

Complications

Dehydration, herpetic keratitis, herpetic paronychia (whitlow), secondary bacterial infection, herpetic encephalitis, oesophagitis.

Treatment

- Counsel caregivers on providing supportive care at home (Counselling box 26) and on management of fever and pain with paracetamol and ibuprofen (Counselling box 25, p. 230).
- Consider topical (mouth) anaesthetics such as lidocaine gel to provide short-term symptomatic relief and improve oral intake.
- Consider oral aciclovir for 5–7 days (see dosages in Annex 4) only within the first 72 hours of disease onset.

Counselling box 26. Home treatment of mouth lesions

How to care for your child with mouth lesions at home

Your child's oral lesions usually need no treatment and last up to 7–10 days.

- Provide local pain relief to help your child eat without pain:
  - Clean your child's mouth: wrap a clean, soft cloth around your finger, dip it in salt water, and wipe the mouth
  - Apply the recommended anaesthetic gel to mouth lesions
  - If your child is old enough to rinse or gargle with liquids, encourage your child to do warm salt-water rinses 3–4 times a day.
  - Apply petroleum jelly or similar ointment to the lips.
- Give paracetamol or ibuprofen if your child is in pain or has high fever (≥ 39 °C) that causes distress.
- Make sure your child drinks more than usual and avoid spicy, salty and hot foods for 7–10 days.
- Return after 2–3 days, or earlier if your child worsens or is unable to drink or breastfeed.

Referral

Refer to hospital any child unable to maintain fluid intake, children with complications and immunocompromised children.

Herpangina

Herpangina is caused by the human enterovirus A group of viruses, mainly Coxsackievirus A.

Diagnosis

Based on clinical presentation:

- Multiple, painful mouth ulcers affecting the posterior oral cavity, including pharynx, uvula, tonsils and soft palate. Sometimes other parts of the mouth, including buccal mucosa and tongue
- Fever

- Dehydration as a result of inadequate fluid intake due to pain when swallowing.

Complications

Aseptic meningitis, encephalitis and acute flaccid paralysis, brainstem encephalitis (especially in immunocompromised patients).

Treatment

Treatment is largely supportive.

- Counsel caregivers how to treat mouth ulcers at home (Counselling box 26).

Acute rheumatic fever

Acute rheumatic fever is an abnormal immune reaction following group A streptococcal infection, usually of the throat (tonsillitis, p. 214). It is most common in young people aged 5–14 years.

Diagnosis

Acute rheumatic fever typically presents with:

- Fever
- "Migratory" arthritis of the large joints (when pain occurs in one joint and then seems to "move" to another)
- Tachycardia
- Sometimes signs of carditis.

Diagnosis is based on the revised Jones criteria (Table 40).

- Initial acute rheumatic fever: 2 major criteria **or** 1 major criterion + 2 minor criteria.
- Recurrent acute rheumatic fever (after first episodes): 2 major **or** 1 major + 2 minor criteria **or** 3 minor criteria.

Table 40. Revised Jones criteria

	Low-risk populations	Moderate- and high-risk populations
History	Evidence of preceding group A streptococcal infection	
Major criteria	• Carditis (clinically or subclinical) • Sydenham's chorea (abnormal limb movements) • Erythema marginatum (rash) • Subcutaneous nodules.	
	• Polyarthritis (multiple painful, swollen joints).	• Arthritis (single or multiple painful, swollen joints).
Minor criteria	• Polyarthralgia (painful joints without swelling) • Fever > 38.5 °C • ESR > 60 mm in 1 hour or CRP > 3.0 mg/dL • Prolonged PR interval after accounting for age, unless carditis is a major criterion.	• Monoarthralgia • Fever > 38 °C • ESR > 30 mm in 1 hour or CRP > 3.0 mg/dL • Prolonged PR interval after accounting for age, unless carditis is a major criterion.

Investigations

- Blood: ESR, CRP, raised antistreptolysin O titres (ASOT) and anti-DNase B titres
- Throat swab to detect the presence of group A streptococci
- Electrocardiogram
- Echocardiogram to identify carditis
- Chest X-ray to examine for evidence of heart failure.

Treatment

- Give oral phenoxymethylpenicillin (penicillin V) for 10 days or a single dose of IM benzathine penicillin (p. 216).
- Give ibuprofen at 5–10 mg/kg 3 times a day (or other nonsteroidal anti-inflammatory such as naproxen) for relief of joint pain until symptoms resolve, usually 1–2 weeks.

- Sydenham's chorea usually resolves over a period of months without treatment. Carbamazepine may be used for severe movement abnormalities.
- Provide secondary antibiotic prophylaxis to reduce the risk of future episodes and rheumatic heart disease (p. 586).

Referral

Refer to specialist for diagnosis and investigations and to hospital all children with heart failure.

Refer urgently to specialist all children with suspected acute rheumatic fever to confirm the diagnosis and for further management.

6.3.2 Fever with rash

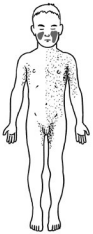
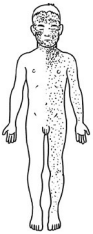
! A non-blanching rash (not fading when pressed with and viewed through a glass spatula) such as petechiae in a sick-looking child with fever may be a sign of a meningococcal infection and requires urgent referral and initiation of antibiotic treatment (ceftriaxone 50 mg/kg IM) if referral is expected to be delayed.

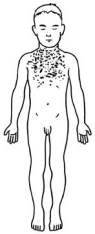
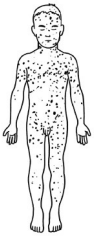
Young children often present with fever and a rash usually caused by a viral infection. Common causes of fever with rash in children are summarized in Table 41. See section 6.14, p. 386 for other conditions presenting with rash, with or without fever.

- Take a full history and perform a comprehensive examination. Investigations to identify the pathogen are usually not required.
- If there are no danger signs (inability to drink/breastfeed, vomiting everything, lethargy, convulsions or altered consciousness), provide supportive care and counsel on management of fever at home (Counselling box 25, p. 230).

Table 41. Differential diagnosis of fever with rash

Diagnosis	Age	Prodrome	Fever	Rash	Other signs
Measles (p. 246)	Any	Cough/cold	High	Maculopapular rash (details on next page)	Koplik's spots Red eyes Cough, diarrhoea, mucositis
Scarlet fever (p.248)	4–10 years	Tonsillitis	High 1–2 days	Maculopapular rash (details on next page)	Strawberry tongue Palatal petechiae
Rubella (p. 249)	Any	No, mild cough/cold	Low	Maculopapular rash (details on next page)	Occipital, posterior cervical, auricular lymphadenopathy
Erythema infectiosum (p. 250)	School age	No, mild cough/cold	Low/ no	Maculopapular rash (details on next page)	–
Exanthema subitum (p. 251)	6–24 months	No	High 3 days	Maculopapular rash (details on next page)	Fever resolves abruptly followed by rash
Kawasaki disease (p. 252)	< 5 years	No	High > 5 days	Generalized Polymorphous Palms and soles affected Oedema hands and feet	Red eyes Cervical lymphadenopathy Oral mucosa changes
Varicella (p. 254)	< 10 years	Mild, fever and malaise	Mild	Vesicular rash (details on next page)	Headache, muscle pain
Hand, foot and mouth disease (p. 256)	School age	No, mild fever and malaise	Mild	Vesicular rash perioral, on palms and soles	Small ulcers on mouth mucosa and tongue

Measles	Scarlet fever	Rubella	Erythema infectiosum	Exanthema subitum	Varicella
Rash starts on face behind ears and spreads caudally Confluent Palms and soles affected	"Sandpaper" rash Rash starts at the neck and spreads to trunk and extremities Marked in skin folds (groin, axillae) Perioral sparing Palms and soles affected	Rash starts on face and spreads caudally (centripetal distribution) Nonconfluent Palms and soles spared	Red macular rash starting on the face ("Slapped cheek") followed by a netlike rash on trunk and extremities with relative perioral pallor Palms and soles spared	Mainly neck and trunk, spreads mildly to face and extremities Nonconfluent Palms and soles spared	Itchy rash starting on the face and trunk (involves scalp), spreads centripetally, sparing palms and soles Can affect mucosa All stages at once: maculopapular, vesicles on red base, crusts

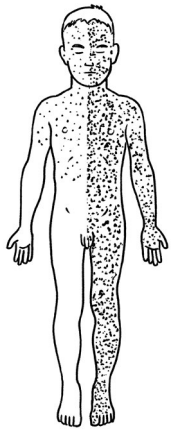
Measles

Measles is a highly contagious viral disease with serious complications and high mortality. It is rare in infants < 3 months of age with increasing vaccination rates, it is affecting older children and adults who are unvaccinated.

Diagnosis

Based on clinical presentation:

- Fever (sometimes with febrile convulsions)
- Generalized maculopapular rash:
  - — Small white spots inside the cheeks (Koplik's spots) just before the generalized rash appears.
  - — Usually starts on the face and upper neck and spreads, reaching hands and feet over 3 days (see picture). It lasts for 5 to 6 days, and then fades.
- And one of the following: cough, runny nose or red eyes and red mouth
- No documented measles vaccination.



Measles
Early (left) and late (right) stage of rash

Complications

Serious complications are more common in children < 5 years. Complications include bloody (p. 285) or persistent diarrhoea and related dehydration (p. 288), otitis media (p. 210), or pneumonia (p. 184). Severe measles is more likely among poorly nourished young children, especially those with insufficient vitamin A and those immunocompromised due to HIV or other diseases. On examination, look for signs of complications, such as:

- lethargy or unconsciousness
- corneal clouding
- deep or extensive mouth ulcers
- pneumonia (p. 184)
- dehydration from diarrhoea (p. 275)
- stridor due to measles croup
- severe malnutrition

Investigations

No laboratory investigations are required. If there are doubts serological tests for IgM antibodies can confirm the diagnosis.

Treatment

No specific antiviral treatment exists for measles virus.

- Children being evaluated for measles should be isolated.
- Counsel caregivers to provide supportive care for fever at home and ask them to return in 2–3 days (Counselling box 25, p. 230).
- Provide supportive care that ensures good nutrition, adequate fluid intake and treatment of dehydration with oral rehydration solution. Give two doses of vitamin A supplement (see dosages in Annex 4) 24 hours apart to all children with measles.

Manage any complications due to measles:

- Mouth ulcers: counsel how to treat mouth ulcers at home (Counselling box 26, p. 240). If the mouth ulcers are severe and/or smelly, give oral amoxicillin (25 mg/kg twice a day) and oral metronidazole metronidazole (7.5 mg/kg three times a day) for 5 days.
- Pneumonia: give antibiotics for pneumonia to all children with measles and signs of pneumonia (p. 184).
- Measles croup (p. 197): give supportive care. Do not give steroids.
- Neurological complications. Convulsions, excessive sleepiness, drowsiness or coma may be symptoms of encephalitis or severe dehydration. Assess the child for dehydration and treat accordingly (p. 275). See Chart 13, p. 727, for treatment of convulsions and Chart 12, p. 726 care of an unconscious child.
- Treat any eye infection if present. If there is a clear watery discharge, no treatment is needed. If there is pus discharge, clean the eyes with cotton-wool boiled in water or a clean cloth dipped in clean water. Apply tetracycline eye ointment three times a day for 7 days. Never use steroid ointment. Use a protective eye pad to prevent other infections. If there is no improvement, refer to an eye specialist.
- See other sections for the management of other complications (see page references in complications above).

Follow-up

Re-evaluate in 2–3 days to make sure the mouth or eye problems are resolving and to rule out any severe complications.

Referral

Refer to hospital in the event of complications (see above) or any of the following signs of severe measles infection and complications such as inability to drink or breastfeed, vomiting everything or convulsions.

Prevention

Measles vaccination (p. 68).

Scarlet fever

Infection occurs most commonly in winter and spring, following infection with group A streptococcus in the throat or on the skin. It is spread from person to person through respiratory droplets or through direct contact with the mucus, saliva or skin of infected people.

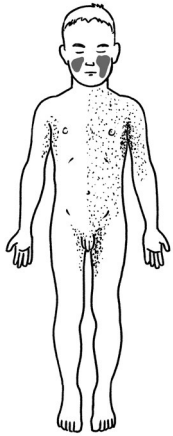
Diagnosis

Based on clinical presentation:

- High fever
- Sore throat or skin infection
- Rash: fine elevated papules, "sandpaper-like" rash which starts in the groin and axilla and then spreads to the trunk and extremities, more marked in the skin folds. It usually spares the perioral area. The skin peels off following 2–7 days of rash
- Strawberry tongue, palatal petechiae, inflamed uvula

Other clinical features can include:

- Abdominal pain, nausea and poor oral intake.



Scarlet fever
Early (left) and late (right) stage of rash

Complications

Be aware of the following complications:

- Acute rheumatic fever (p. 241)

- Acute kidney disease (see post-streptococcal glomerulonephritis p. 350)
- Reactive arthritis (p. 421).

Investigations

- Rapid streptococcal antigen detection test, if you need to confirm the diagnosis.

DO NOT perform routine nonspecific laboratory tests.

Treatment

- ▶ Counsel caregivers to provide supportive care for fever at home and when to return (Counselling box 25, p. 230).
- ▶ Give oral phenoxymethylpenicillin (penicillin V) 125 mg in children < 1 year, 250 mg in children 1–5 years, 500 mg in children 6–12 years in 2 daily doses or amoxicillin at 50 mg/kg/day in 1 or 2 daily doses for 10 days.
- If allergic to penicillin:
  - — With type I hypersensitivity (anaphylaxis): oral erythromycin or another macrolide. **DO NOT** use azithromycin.
  - — Without type I hypersensitivity: oral cefadroxil or cephalexin.

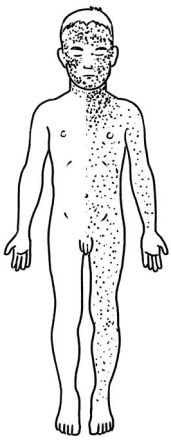
Rubella (German measles)

The virus spreads throughout the body in 5–7 days. Symptoms usually appear 2–3 weeks after exposure. The most contagious period is usually 1–5 days before and after the appearance of the rash.

Diagnosis

Based on clinical presentation:

- ■ Pinpoint, pink maculopapular rash (50–80%): usually starts on the face and neck before progressing down the body within 24 hours and lasts 1–3 days
- ■ Cough, sore throat, runny nose



Rubella
Early (left) and late (right) stage of rash

- Low-grade fever < 39 °C
- Nausea
- Lymphadenopathy (especially posterior cervical, auricular and suboccipital)
- Conjunctivitis
- Painful joints.

Investigation

No laboratory tests are required.

Treatment

Symptomatic, no specific therapy.

- Counsel caregivers to provide supportive care for fever at home and when to return (Counselling box 25, p. 230).

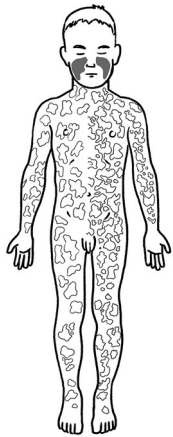
Erythema infectiosum

The infection is caused by parvovirus B19.

Diagnosis

Based on clinical presentation, which can vary greatly.

- Erythematous macular rash with relative circumoral pallor, which often starts on the face (so-called "slapped cheek" rash) followed by a netlike rash on the trunk and extremities
- Flu-like symptoms (headache, malaise, coryza, and diarrhoea)
- Arthralgia.



Erythema infectiosum
Early (left) and late (right) stage of rash

Investigations

No laboratory tests are required.

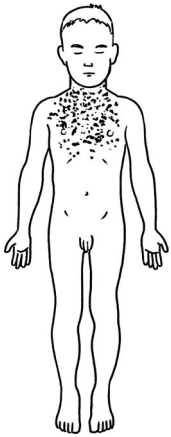
Treatment

None, erythema infectiosum is a self-limiting disease.

- Counsel caregivers to provide supportive care for fever at home if necessary (Counselling box 25, p. 230).

Exanthema subitum (Roseola)

The infection is mainly caused by human herpesvirus 6, but also by other viruses such as human herpesvirus 7, enteroviruses and adenoviruses.



Exanthema subitum

Diagnosis

Based on clinical presentation:

- 3–5 days of fever that typically resolves abruptly and is followed by development of a rash
- Rash: erythematous, blanching, macular or maculopapular, usually starting on the neck and trunk and spreading to the arms and legs

Other signs are:

- Lymphadenopathy
- Erythematous tympanic membranes (no effusion)
- Irritability
- Upper respiratory tract symptoms.

Investigations

No laboratory tests are required.

Treatment

No specific therapy.

- Counsel caregivers to provide supportive care for fever at home (Counselling box 25, p. 230).

Infectious mononucleosis

Infectious mononucleosis, also called glandular fever or "kissing disease", is caused by Epstein-Barr virus (EBV). The majority of EBV infections are subclinical and typically affect older adolescents and young adults. When the clinical features are caused by a virus other than EBV such as cytomegalovirus, herpesvirus 6, HIV, it is called mononucleosis syndrome.

Diagnosis

- Lymphadenopathy, mainly cervical
- Sore throat, exudative pharyngitis with white, grey-green or necrotic tonsillar exudate; halitosis
- Fever, up to 1–2 weeks duration
- Fatigue, may be persistent and severe
- Enlarged liver or spleen

Investigations

- White cell count: lymphocytosis with a significant proportion of atypical lymphocytes
- Monospot, a rapid diagnostic test, or EBV serology can confirm the diagnosis.

Treatment

Treatment is symptomatic. There is no specific therapy.

DO NOT give amoxicillin. Infectious mononucleosis is easily misdiagnosed as tonsillitis or scarlet fever and amoxicillin can cause a generalized skin rash.

- Counsel on supportive care for fever at home and when to return (Counselling box 25, p. 230). In addition to the messages in the box remember to counsel that:
  - If the spleen is enlarged, it is important to avoid any activities at risk of abdominal trauma (may cause spleen rupture)
  - Fatigue may persist for several weeks.

Kawasaki disease

Kawasaki disease is a common vascular inflammatory disease and mainly affects children under 5 years of age. Kawasaki disease is the most common cause of acquired heart disease in children in developed countries. It leads to coronary artery aneurysms in around 25% of untreated cases. Prompt diagnosis and early treatment is essential.

Diagnosis

Based on diagnostic criteria (Table 42). If a child does not meet the diagnostic criteria for classic Kawasaki disease, be aware of atypical Kawasaki disease (Table 43).

Table 42. Diagnostic criteria for classic Kawasaki disease

Fever ≥ 5 days* without any other explanation **and** at least 4** of the following clinical criteria:

- Conjunctivitis: bilateral, bulbar, nonsuppurative
- Cervical lymphadenopathy: ≥ 1.5 cm, often unilateral
- Rash: polymorphous, no vesicles or crusts
- Changes in lips or oral mucosa: cheilitis (red cracked lips), strawberry tongue, diffuse erythema of oropharynx
- Changes at extremities: initially erythema and oedema of palms and soles followed by peeling of skin from fingertips.

* If ≥ 4 clinical criteria are present, diagnosis can be made following 3–4 days of fever.
** If coronary artery abnormalities are present, diagnosis is confirmed even with less than 4 criteria.

Table 43. Diagnostic criteria for incomplete or atypical Kawasaki disease

Fever ≥ 5 days without any other explanation **and** 2–3 clinical criteria (Table 42).
Infants with fever ≥ 7 days without any other explanation.

And CRP ≥ 3.0 mg/dL or ESR ≥ 40 mm/1h.

And at least 3 of the following laboratory findings:

- Anaemia for age
- Platelet count ≥ 450 000 after day 7 of fever
- Albumin ≤ 3.0 g/dL
- Elevated ALT level
- White blood cell count (WBC) ≥ 15 000/mm^3
- Urine ≥ 10 WBC/high-power field

or positive echocardiography (specific findings established).

Other findings include: extreme irritability, arthritis, diarrhoea, vomiting, abdominal pain, hepatitis, jaundice, aseptic meningitis.

Investigations

- Full blood count including white blood cell count, platelet count, transaminases, inflammatory markers (CRP, ESR)
- Elevated white blood cell and platelet count, transaminases and acute phase reactants are often present.
- Echocardiography to assess cardiac involvement.

Complications

Coronary artery abnormalities, depressed myocardial contractility, shock syndrome, neurological problems (i.e. hearing loss).

Referral

Refer to specialist or hospital all children with suspected Kawasaki disease.

Follow-up

Ensure adequate follow-up after back-referral or hospital discharge. The management is primarily aimed at preventing and treating coronary artery abnormalities and coronary artery thrombosis with intravenous immunoglobulin (by a specialist or in hospital) and aspirin.

- ▶ Give acetylsalicylic acid (aspirin) at low-dose (3–5 mg/kg/dose once a day) for anti-platelet effect for several weeks until normalization of platelet count and based on echocardiography findings.
- ▶ Repeat echocardiography according to the specialist management plan.

Varicella (chickenpox)

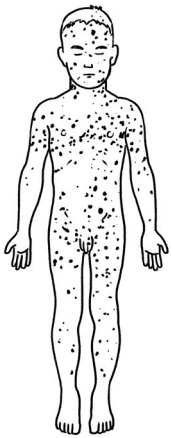
Varicella is an acute, highly contagious disease caused by varicella zoster virus (VZV). Transmission occurs via droplets, aerosol or direct contact, or indirectly by touching freshly contaminated items. Patients are usually contagious from a few days before onset of the rash until the rash has crusted over.

Diagnosis

Based on clinical presentation:

- Very itchy rash:
  - — Lesions in a variety of stages: maculopapular, vesicular and even pustular, central necrosis and early crusting

  - — Usually starting on scalp and face
  - — Centrifugal distribution to the trunk and extremities but sparing the palms and soles
  - — Can affect mucosa (aphthous lesions in gingiva, dorsum of the tongue, palate, oropharynx)
  - — Takes about 7–10 days for all crusts to disappear.
- Malaise
- Pharyngitis
- Loss of appetite



Varicella

Investigations

No laboratory tests are required.

Complications

Complications include VZV-induced pneumonitis or encephalitis. Following infection, the virus remains latent in neural ganglia; upon subsequent reactivation, VZV causes Herpes zoster (shingles).

Treatment

- Give an oral antihistamine such as loratadine for 2–3 days if the child presents intense itchiness.
- Counsel caregivers to provide supportive care at home (Counselling box 27).

Referral

Refer immunocompromised children (e.g. with cancer, HIV) to hospital for further assessment and management, including aciclovir therapy.

Prevention

Varicella can be prevented by immunization (p. 68).

Counselling box 27. Home treatment of varicella

How to care for your child with varicella at home

- Apply calamine lotion to relieve itchiness.
- Dress your child in long-sleeved and -legged clothes, and keep nails cut short to avoid scratching (reduces risk of infections and scarring of the skin).
- Tell your child not to scratch the lesions.
- Give paracetamol if the child has high fever (≥ 39 °C) that causes distress.
- Make sure your child drinks more than usual.
- Return if the fever persists after 2–3 days, or earlier if your child worsens or is unable to drink or breastfeed.

Hand, foot and mouth disease

The same childhood febrile rash syndrome can manifest in two ways: hand, foot and mouth disease and herpangina (p. 240). Both are common in childhood and caused by the human enterovirus A group of viruses. Herpangina is characterized by an isolated oral mucosal involvement, while hand, foot and mouth disease presents with a combination of oral lesions and skin changes affecting palms and soles.

Diagnosis

Based on clinical presentation:

- Fever of short duration
- Painful small ulcers on the oral mucosa or tongue
- Typical papulovesicular rash affecting the palms or soles or both, which appear 1–2 days after the mouth ulcers. Secondary bacterial skin infection is unusual.
- Dehydration, a result of inadequate intake of fluid secondary to pain when swallowing caused by the painful mouth ulcers.

Treatment

Clinical management is largely supportive.

- Counsel caregivers how to treat the mouth ulcers at home (Counselling box 26, p. 240).
- If there is pus due to a secondary bacterial infection, give tetracycline or chloramphenicol ointment for topical application.

6.3.3 Fever lasting longer than 7 days

History and examination

Take a detailed history (p. 225) and comprehensive examination (p. 226) to reach a diagnosis and avoid unnecessary investigations. Some causes of persistent fever such as septicaemia, typhoid fever, miliary tuberculosis, HIV infection or urinary tract infection in young children may have no localizing signs.

Investigations

- Full blood count, including platelet count, C-reactive protein (CRP), erythrocyte sedimentation rate, procalcitonin
- Blood films or rapid diagnostic test for common endemic causes of fever
- Urinalysis, including microscopy.

In addition, depending on the suspected diagnosis:

- Chest X-ray
- Mantoux test
- Blood culture
- Specific serologies
- HIV testing
- Abdominal ultrasound.

It may be necessary to refer the child for further investigations.

Differential diagnosis

Review the conditions in Tables 38 (p. 231), 39 (p. 232) and 41 (p. 244). Consider the main causes of long-lasting fever in Table 44. Think of the most common causes in your specific geographical area. If no causes are identified, consider the possibility of rheumatological diseases and malignancies.

Table 44. Differential diagnosis of fever lasting longer than 7 days

Diagnosis	In favour
Infections	
Urine tract infection (p. 356)	• Vomiting, poor feeding • Lethargy, irritability • Abdominal pain, loin or suprapubic tenderness • Urinary frequency or dysuria, incontinence in previously continent child.
Tuberculosis (p. 631)	• Family history of TB • Unexplained weight loss, failure to grow normally • Chronic cough • Enlarged non-tender lymph nodes, abdominal swelling • Auscultory and X-ray findings: primary complex, tuberculosis pneumonia, miliary.
Abscess (p. 261)	• Local tenderness or pain • Specific signs depend on site (liver, subphrenic, psoas, retroperitoneal, lung, renal) • A deep abscess might present with fever only without a focal sign.
Osteomyelitis (p. 422)	• Local tenderness and swelling over the bone • Localized pain and pain on movement • Refusal to move the affected limb or to bear weight on leg.
Infective endocarditis (p. 329)	• Unexplained weight loss • Enlarged spleen • Pallor • Heart murmur, underlying heart disease • Petechiae, finger clubbing or splinter haemorrhages in nail beds.
Brucellosis (p. 262)	• History of drinking raw milk or other dairy products • Relapsing or persistent fever • Malaise, musculoskeletal pain, lower backache or hip pain, enlarged spleen, lymphadenopathy, pallor • Knowledge of local prevalence.

Diagnosis	In favour
Lyme disease (p. 263)	• History of tick bite • Local prevalence • Erythema migrans • Fever, fatigue, headache, myalgia.
Tick-borne fever (p. 265)	• History of lice or tick bites • Knowledge of local prevalence • Recurrent episodes (3–5 days) of high fever, chills, headache, muscular and articular pains, vomiting • Asymptomatic between episodes.
Boutonneuse fever (Mediterranean spotted fever) **(p. 266)**	• History of tick bite • Abrupt onset with high fever, chills, muscular and articular pains, severe headache • Black, ulcerous crust ("tache noire") in the bite location • 3–5 days after onset of fever, widespread macular rash, then maculopapular, sometimes petechial.
Fever associated with HIV infection (p. 623)	• Persistent or recurrent fever • Recurrent infections (3 or more severe bacterial infections in 12 months) • Oral thrush, chronic parotitis, generalized lymphadenopathy, enlarged liver with no apparent underlying cause, neurological dysfunction, HIV dermatitis.
Less common infectious condition in the European setting. Refer for further investigations to confirm the suspected diagnosis.	
Typhoid fever	• History of travel • Persistent fever • Constipation, diarrhoea, vomiting, abdominal pain, headache, cough, transient rash, enlarged liver and spleen • Adolescents can present with confusion.

Diagnosis	In favour
Rheumatological diseases	
Acute rheumatic fever (p. 241)	• History of recent scarlet fever or tonsillitis • Migratory joint pains • Heart murmur • Subcutaneous nodules, erythema marginatum • Sydenham's chorea.
Juvenile idiopathic arthritis (p. 427)	• Joint pain and/or swelling affecting one or several joints, for several weeks • Persistent fever • Rash (macular, usually on trunk) • Lymphadenopathy, spleen and/or liver enlarged.
Systemic lupus erythematosus	• Persistent fever • Weight loss • Pallor, fatigue • Rash (malar rash, photosensitivity) • Joint pain and/or swelling • Lymphadenopathy.
Neoplastic disorders	
Malignancy	Any of these signs: heavy sweating, pallor, bruising, enlarged liver or spleen, petechiae, bone pain that disrupts the child's activities, loss of appetite, weight loss, vomiting and fatigue, lymphadenopathy.
Other	
Munchausen syndrome by proxy (p. 640)	• Symptoms and signs only (re)appear or are reported when the parent or caregiver is present • New symptoms are reported as soon as previous ones resolve • Unusual attendance at medical services • Inexplicable poor response to prescribed treatment.

Fever of unknown origin

Fever of unknown origin refers to fever documented by a health care provider and for which a cause cannot be identified after 3 weeks' evaluation as an outpatient or after 1 week's evaluation in hospital.

Most cases are due to atypical presentations of common diseases.

The main causes include infections, rheumatological diseases, neoplastic disorders and drug fever. Refer to paediatric textbooks for additional and less common causes to proceed with further investigations and management.

Abscess

An abscess is a collection of pus, usually caused by a bacterial infection, which can develop anywhere in the body. There are two main types of abscesses: skin or soft tissue abscesses (p. 394) and internal (deep) abscesses, which can develop in any organ or in the spaces between organs. Internal abscesses are more difficult to diagnose and can present with long-lasting fever. They often develop as a complication of an existing condition (e.g. complicated appendicitis, post-surgery).

Signs and symptoms

Signs and symptoms of internal (deep) abscesses:

- Fever with no obvious focus of infection
- Local tenderness or pain, e.g. on abdominal palpation for suspected intra-abdominal abscess
- Malaise
- Specific signs depend on site (liver, subphrenic, psoas, retroperitoneal, lung, renal).

Investigations

- Ultrasound when available
- Refer for further investigations (MRI) depending on the suspected location.

Treatment and referral

Refer to a specialist for further assessment and management (percutaneous drainage or surgical intervention).

Follow-up

Ensure that antibiotics prescribed by the specialist are completed according to the specialist's plan. Match the antibiotic selection to the culture and susceptibility findings from fluid or pus samples as soon as available.

Brucellosis

Brucellosis, also known as "undulant fever", "Mediterranean fever" or "Malta fever", is an infectious disease transmitted to humans through direct contact with infected animals (cattle, goat, sheep, pigs, dogs) or by eating infected food (raw milk or other dairy products). Local knowledge of prevalence is important.

Signs and symptoms

- History of drinking raw milk or other dairy products
- Incubation period: 2–4 weeks, may be longer
- Relapsing or persistent fever
- Malaise, musculoskeletal pain, lower backache or hip pain, headache
- Enlarged spleen, enlarged liver, lymphadenopathy, pallor.

Complications

Spondylitis, neurobrucellosis, endocarditis, pneumonia, abscesses.

Investigations

- Blood analysis: anaemia, leukopenia or leukocytosis, lymphocytosis, thrombocytopenia, mild increase of C-reactive protein and erythrocyte sedimentation rate

Confirm diagnosis with either:

- Positive blood or urine culture (if other samples are required, e.g. bone marrow, cerebrospinal or synovial fluid, refer to hospital) ***or***
- Serological testing for antibodies against *Brucella* sp.: at least a fourfold rise in antibody titre between two specimens obtained ≥ 2 weeks apart (during the acute phase and after ≥ 2 weeks)

Treatment

▶ In children ≥ 8 years, give oral doxycycline (6 weeks) **and** IM streptomycin (2–3 weeks) or oral rifampicin (6 weeks) (see dosages, Annex 4).

- In children < 8 years, give oral trimethoprim-sulfamethoxazole (6 weeks) **and** oral rifampicin (6 weeks).
- Counsel caregivers to provide supportive care for fever at home and when to return (Counselling box 25, p. 230).

Referral

Refer to hospital when you suspect any complication and for investigations to confirm the diagnosis if needed.

Lyme disease

Lyme disease, also known as Lyme borreliosis, is caused by the spirochaete *Borrelia burgdorferi*. The infection occurs through the bite of infected ticks of the genus *Ixodes*. The disease usually has its onset in summer. Local knowledge of prevalence is important. If untreated, the disease disseminates, usually 3–12 weeks after the tick bite, with worsening symptoms and emerging complications.

Signs and symptoms

- History of tick bite

Early localized disease:

- Erythema migrans: early skin lesions occur as an expanding ring with a central clear zone at the site of the tick bite. May vary greatly in shape. Usually not itchy and not painful. Without treatment, the rash expands.
- Fever, fatigue, headache, myalgia.

Early disseminated disease:

- Multiple erythema migrans
- Loss of the ability to move one or both sides of the face (peripheral facial nerve palsy)
- Severe headaches with neck stiffness (meningitis)
- Heart palpitations (carditis)
- Ocular disease (conjunctivitis).

Late disease:

- Joint pains (arthritis), usually single joint (knee).

Investigations

- In most cases, history of tick bite and erythema migrans lead to the diagnosis and investigations are not necessary. Serological testing for antibodies against *B. burgdorferi* or detection of spirochaetes on blood film.

Treatment

▶ For an early infection (erythema migrans) with no sign of disseminated disease, give doxycycline for 10 days ***or*** amoxicillin for 14 days ***or*** cefuroxime for 14 days (see dosages, Annex 4). Longer duration of treatment is needed if the child or adolescent presents other clinical manifestations.

Referral

Refer to a specialist or hospital if any sign of early disseminated infection.

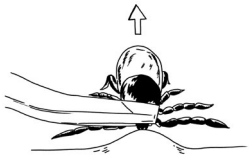
Prevention

▶ Give a prophylactic single oral dose of doxycycline 4.4 mg/kg (max. 200 mg) ONLY if within 72 hours of tick removal and if tick-bite can be

Counselling box 28. Prevention and management of tick bites

How to avoid tick bites and what to do if they occur

- Ensure your child wears long sleeves and long trousers when playing in grassy areas or in the forest. After playing outside, undress your child and examine the clothes and entire body including skin folds for ticks and tick bites.
- In the event of a tick bite, remove the tick as soon as possible (see image).
- Seek medical advice when symptoms (such as erythema migrans) develop.



Removing a tick: *remove the tick with a clean fine-tipped tweezer, by grasping the tick as close to the skin as possible. Pull upward with steady, even pressure. Do not twist the tick.*

identified as high risk: tick identified as *Ixodes* sp. AND tick bite occurred in a highly endemic area AND tick attached for ≥ 36 hours.

- Counsel caregivers how to prevent tick bites and how to manage tick bites if they occur (Counselling box 28).

Tick-borne relapsing fever

Tick-borne relapsing fever is caused by certain bacteria of the genus *Borrelia* and is transmitted by the bite of infected ticks. Local knowledge of prevalence is important.

History

- Recurrent episodes (3–5 days) of high fever with chills and sweating
- Nonspecific symptoms during febrile episode: headache, myalgia, arthralgia, nausea, vomiting, abdominal pain, diarrhoea, cough
- Asymptomatic between episodes.

Examination

Children may present:

- Rash (macular on trunk, petechiae)
- Enlarged liver and spleen
- Jaundice
- Red eyes
- Decreased level of consciousness.

Investigations

Spirochaetes on blood film (microscopy) confirm the diagnosis.

Treatment

- Give oral doxycycline for 10 days (see dosages, p. 825). If doxycycline is contraindicated (severe allergic reaction, history of hepatotoxicity) give oral erythromycin for 10 days.
- Counsel caregivers to provide supportive care for fever at home and when to return (Counselling box 25, p. 230).
- Counsel on how to prevent future tick bites and manage tick bites if they occur (Counselling box 28).

Boutonneuse fever (Mediterranean spotted fever)

Boutonneuse fever is caused by *Rickettsia conorii*, typically found in the Mediterranean region. It is transmitted by the bite of a dog tick.

Signs and symptoms

- Abrupt onset with high fever, chills, muscular and articular pains, severe headache
- Black ulcerous crust, known as "tache noire" (black eschar) at the bite location
- 3–5 days after the onset of fever, a widespread macular rash appears which then becomes maculopapular with rounded papules resembling buttons, sometimes petechial. The rash starts at the extremities on the palms and soles, then spreads to trunk and abdomen.

Investigations

Serology, PCR and blood culture confirm the diagnosis.

Treatment

- Give oral doxycycline for 7–10 days (see dosages, p. 825), as soon as you suspect the disease, without waiting for laboratory results. If doxycycline is contraindicated (severe allergic reaction, history of hepatotoxicity), give oral azithromycin for 7–10 days.
- Counsel caregivers to provide supportive care for fever at home and when to return (Counselling box 25, p. 230).
- Counsel on how to prevent future tick bites and how to manage tick bites if they occur (Counselling box 28, p. 264).

6.3.4 Recurrent fever

Recurrent or periodic fever syndromes are defined by ≥ 3 episodes of unexplained fever in a 6-month period, occurring at least 7 days apart. The febrile episodes are usually associated with a range of symptoms, and the child or adolescent usually feels well between the episodes.

As febrile episodes are common in young children, mainly caused by repeated acute viral infections, it can be challenging to identify recurrent fever syndromes. Although they are not common during childhood, it is important to recognize them for early diagnosis and appropriate management (Table 45). Refer to paediatric textbooks and refer to a specialist if required.

Table 45. Differential diagnosis of recurrent fever

Characteristics	Differential diagnosis
Fever at *irregular* intervals	Infections: • Viral: EBV, parvovirus B19 (p. 250), herpes simplex virus (p. 239) • Atypical mycobacteria, brucellosis (p. 262), borreliosis (p. 263) • Malaria Inflammatory or autoimmune diseases: • Juvenile idiopathic arthritis (p. 427) • Systemic lupus erythematosus • Relapsing polychondritis • Crohn's disease • Behçet's disease Malignancies: • Lymphoma.
Fever at *regular* intervals	• Periodic fever with aphthous stomatitis, pharyngitis and adenitis (PFAPA) syndrome • Cyclic neutropenia.
Fever *occasionally at regular* intervals	• Familial Mediterranean fever (below) • Hyper IgD syndrome • EBV infection.

Familial Mediterranean fever

Familial Mediterranean fever is a hereditary autoinflammatory disorder. It is most prevalent in individuals of Turkish, Armenian, North African, Jewish and Arab descent.

Signs and symptoms

- Recurrent fever (1–3 days) every 1–4 weeks (or longer episodes), asymptomatic between episodes
- Joint pain (mostly hip, knee, ankle)
- Abdominal pain (sterile peritonitis)
- Chest pain (pleuritis, unilateral)
- Erysipelas-like rash.

Referral

Refer to specialist for genetic confirmation and treatment.

6.3.5 Fever in the child coming from abroad

This section applies to all children or adolescents returning from travel (tourism or visiting friends and relatives) but also from international adoption and immigration.

History

- Travel details (destinations, duration of travel), time since returning, timing of symptom onset
- Setting: rural/urban, living conditions, altitude, season (monsoon, dry)
- Exposure: unclean water, food consumption (unpasteurized dairy, meat, seafood, undercooked food), swimming in fresh water, insect bites (especially mosquitoes, ticks), animal bites or other animal exposures, sexual encounters (when age-appropriate), contact with sick person(s)
- Vaccinations, malaria chemoprophylaxis, clothing, insect nets, repellent.

Examination

Perform a comprehensive physical examination and pay attention to:

- Chest auscultation: wheezing, crackles
- Abdomen: enlarged liver, enlarged spleen, tenderness
- Skin inspection: pallor, jaundice, rash, purpura, bites
- Enlarged lymph nodes
- Neurological examination: confusion, focal deficits.

Differential diagnosis

In addition to common diseases that present with fever (see Tables 38 (p. 231), 39 (p. 232) and 41 (p. 244)), consider imported causes of fever based on accompanying signs and duration of fever as summarized in Table 46. See relevant sections of this book or other textbooks for additional information, and refer to a specialist or hospital as appropriate.

Table 46. Differential diagnosis of imported fever

Accompanying signs	Differential diagnosis
Fever *without focalizing signs*	• Malaria • Dengue fever • Typhoid fever • Schistosomiasis • Tuberculosis (p. 631) • Acute viral hepatitis (p. 415) • Brucellosis (p. 262) • Haemorrhagic fevers • Leptospirosis • Rickettsiosis • Amoebic liver abscess (*Entamoeba histolytica*).
Fever *with respiratory symptoms*	• Coronavirus respiratory infection (MERS-CoV, SARS-CoV-2) (p. 188) • Tuberculosis (p. 631) • Legionnaires' disease • Leptospirosis • Q fever • Acute schistosomiasis • Malaria • Histoplasmosis • Löffler's syndrome • Strongyloidiasis • Fungal infection.
Fever *with neurological symptoms (decreased consciousness, seizure)*	• Malaria • Viral or bacterial meningitis (p. 235) • Japanese encephalitis • African trypanosomiasis • Neurocysticercosis • Scrub typhus.
Fever *with diarrhoea*	• Typhoid fever • Shigellosis (p. 285) • Other enteropathogens, e.g. *Campylobacter* sp. • Dengue fever • Malaria.

Accompanying signs	Differential diagnosis
Fever *with rash*	• Dengue fever • Chikungunya • Typhoid fever • Zika • Rickettsiosis • Measles (p. 246) • Lyme disease (p. 263) • Acute HIV infection (p. 623) • Haemorrhagic fevers • Leptospirosis • Scrub typhus.
Fever *with jaundice*	• Malaria • Acute viral hepatitis (p. 415) • Dengue fever • Leptospirosis • Brucellosis (p. 262) • Yellow fever • Haemorrhagic fevers • Scrub typhus.
Fever *with enlarged spleen*	• Malaria • Mononucleosis syndrome (EBV, CMV, HIV) (p. 251) • Visceral leishmaniasis • Typhoid fever • Brucellosis (p. 262) • Trypanosomiasis • Schistosomiasis.
Fever *lasting longer than 7 days*	• Malaria • Typhoid fever • Tuberculosis (p. 631) • Visceral leishmaniasis • Q fever • Brucellosis (p. 262) • Toxoplasmosis • Acute HIV infection (p. 623) • Schistosomiasis.

6.4 Diarrhoea

Diarrhoea is defined as the passage of ≥ 3 loose or watery stools per day. Frequent passing of formed stools is not diarrhoea, nor the passing of loose, "pasty" stools by breastfed babies.

- Rehydration therapy and counselling for continued feeding are essential in the management of all children with diarrhoea.
- Infants < 12 months of age and children with malnutrition presenting with diarrhoea are at higher risk of severe dehydration.
- Antiprotozoal drugs are rarely indicated.

DO NOT routinely give "antidiarrhoeal" drugs or anti-emetics: they do not prevent dehydration or improve nutritional status, and some have dangerous and occasionally fatal side-effects.

DO NOT give antibiotics to children with watery diarrhoea.

History

- Characteristics of the stools:
  - Frequency of stools
  - Watery stools, "pasty" stools
  - Blood in stools
  - Stools over night
  - Number of days of diarrhoea.
- Associated symptoms:
  - Abdominal pain or distension
  - Excessive burping and gas
  - Episodes of diarrhoea, abdominal pain or cramping alternating with constipation
  - Nausea and vomiting
  - Fever
  - Low appetite, weight loss
  - Irritability
  - Attacks of crying with pallor in infants.
- Other factors:
  - Recent antibiotic or another drug treatment
  - Persons at school or household with similar symptoms
  - Recent travelling.
- Diet and feeding history:
  - Juice or sugar-sweetened beverages
  - Eating raw/undercooked meat, pork or fish.
- For persistent diarrhoea ≥ 14 days:
  - Foods containing wheat, barley and rye (gluten), intake of milk and milk products
  - Known underlying medical conditions e.g. cystic fibrosis
  - Failure to thrive, review growth chart
  - Family history of inflammatory bowel disease.

Examination

- Signs of minor or severe dehydration:
  - Restlessness or irritability
  - Lethargy or reduced level of consciousness
  - Sunken eyes
  - Skin pinch returns slowly or very slowly (≥ 2 sec)

  - Weight loss
  - Child is thirsty or drinking eagerly, or drinking poorly or not able to drink at all.
- Blood in stools
- Signs of severe malnutrition
- Abdominal mass
- Abdominal distension
- Rash, purpura, petechiae
- Swollen joints
- Muscle wasting
- Pallor
- Skin rash.

Investigations

DO NOT perform routine stool microscopy or culture in children with non-bloody diarrhoea.

Investigations may be needed for children with persistent diarrhoea (p. 288).

Differential diagnosis

Diarrhoea is usually a symptom of a gastrointestinal infection with a viral, bacterial or parasitic organism, but it can also be a symptom of other acute or chronic conditions.

For main causes of diarrhoea, see Table 47, p. 274.

For persistent diarrhoea lasting ≥ 14 days, see Table 49, p. 288.

For diarrhoea in children with a travel history or coming from abroad, see Table 46, p. 269.

Table 47. Differential diagnosis of diarrhoea and other abdominal problems

Diagnosis	In favour
Acute diarrhoea (gastroenteritis) **(p. 275)**	• Vomiting • Fever • Abdominal pain (colic) • No blood in stools.
Antibiotic-associated diarrhoea (p. 284)	• Recent or current course of broad-spectrum oral antibiotics.
Food poisoning (p. 284)	• Persons who ingested the same food also affected • Cramping abdominal pain • May be of rapid onset.
Dysentery (p. 285)	• Blood in stool (seen or reported).
Appendicitis	• Sharp pain in right lower quadrant • Rigid abdomen, abdominal guarding and tenderness, peritonitis • Fever, anorexia, nausea, vomiting, constipation or diarrhoea.
Intussusception	• Infant or young child • Abdominal mass • Vomiting • Looks ill • Abrupt episodes of crying/pain with pallor and floppiness • Blood and mucus in stools (late sign).
Worms (p. 298)	• Small white worms or large piece of worm in faeces • Itching around the anus, particularly at night with difficulty sleeping and restlessness • Anorexia, nausea, vomiting, diarrhoea, abdominal pain or distension • History of travel to endemic areas or of eating raw/undercooked meat, pork or fish.

Diagnosis	In favour
COVID-19 (p. 188)	• History of exposure to COVID-19 • Fever, cough, fast breathing, lower chest wall indrawing • Diarrhoea, vomiting • Headache, muscle pain, fatigue • Loss of smell, loss of taste.
Cholera	• Profuse watery diarrhoea with severe dehydration during cholera outbreak.

6.4.1 Acute diarrhoea (gastroenteritis)

Acute diarrhoea typically lasts less than 7 and no more than 14 days. Acute diarrhoea is very common, especially among children under 5 years of age. It can be caused by several viruses and bacteria. Rotavirus has been the most common cause of acute diarrhoea and is often associated with dehydration. With widespread vaccination, it has become less common.

Signs and symptoms

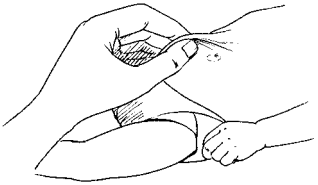
- Acute watery diarrhoea
- Nausea, vomiting
- Fever
- Abdominal cramps (colic)
- Signs of dehydration (see below).

Assessing dehydration

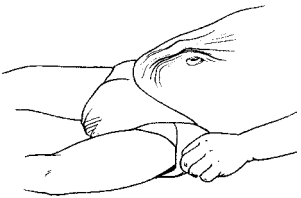
The main risk of diarrhoea is dehydration. Therefore, classify the hydration status of all children with diarrhoea as **no dehydration**, **some dehydration** or **severe dehydration** (Table 48) and treat accordingly. Assess the child's general condition, look for sunken eyes, make a skin pinch, and offer the child fluid to see if he or she is thirsty or drinking poorly.

Table 48. Classification of the severity of dehydration in children with diarrhoea

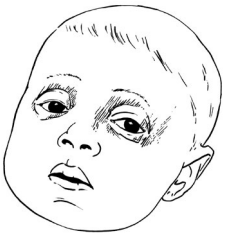
Classification	Signs or symptoms
No dehydration	Not enough signs to classify as some or severe dehydration
Some dehydration	≥ 2 of the following signs: ■ Restlessness, irritability ■ Sunken eyes ■ Drinks eagerly, thirsty ■ Skin pinch goes back slowly.
Severe dehydration	≥ 2 of the following signs: ■ Lethargy or unconsciousness ■ Sunken eyes ■ Unable to drink or drinks poorly ■ Skin pinch goes back very slowly (≥ 2 s).



Pinching the child's abdomen to test for decreased skin turgor



Slow return of skin pinch in severe dehydration



Sunken eyes

Investigations

- Routine investigations are not required
- Microbiological investigations of stool (culture and microscopy) in children with prolonged symptoms, underlying chronic conditions, in severe condition and those with a travel history.

Treatment

Acute diarrhoea (gastroenteritis) is usually self-limited.

Rehydration therapy and counselling for continued feeding and prevention are essential in the management of all children with diarrhoea:

▶ Start treatment according to severity of dehydration:

— ***No dehydration:*** treat diarrhoea at home according to treatment plan A (p. 279)

— ***Some dehydration:*** give fluids according to treatment plan B (p. 281)

— ***Severe dehydration:*** refer urgently. Start fluids according to treatment plan C (p. 283) while awaiting referral.

DO NOT give antidiarrhoea medications.

DO NOT give antibiotics for children with acute watery diarrhoea.

Follow-up

▶ Follow up children with no or some dehydration in 5–7 days if not improving.

▶ Check rotavirus vaccination status (p. 72).

No dehydration

Children with diarrhoea but no dehydration can be treated at home. They should receive extra fluids to prevent dehydration and an appropriate healthy diet for their age (p. 81) including continued breastfeeding.

- Counsel the caregivers on home treatment (Chart 1A) and when to return.
- Make sure the caregivers know how to prepare ORS, teach them when needed. See Annex 6 for ORS composition.
- Counsel caregivers to continue feeding (infants) or providing a healthy diet to children and adolescents (p. 93).
- If the child is not normally breastfed, explore the feasibility of restarting breastfeeding (p. 83) or giving the usual breast milk substitute.
- Give zinc supplements: one tablet (20 mg) per day for 10–14 days to children ≥ 6 months in areas with a high prevalence of zinc deficiency or if the child is malnourished.
- Show the caregivers how to give zinc supplements:
  - — For infants, dissolve the tablet with a small amount of clean water, expressed milk or ORS in a small cup or spoon.
  - — Older children can chew the tablet or drink it dissolved in a small amount of clean water in a cup or spoon.

Hygiene measures and counselling

- Counsel the family about hygiene measures and how to prevent diarrhoea:
  - — Wash your hands with soap and water more often:
    - After going to the toilet
    - After you assess your child going to the toilet
    - After changing nappies
    - Before preparing or eating food.
  - — Use different towels for your child with diarrhoea and for the rest of the family.
  - — Exclusive breastfeeding is the best way to prevent diarrhoea in the first 6 months of life.

  DO NOT let your child go to day-care or school if they have diarrhoea or vomiting caused by acute diarrhoea.

Chart 1A. Diarrhoea treatment plan A

Treat diarrhoea at home

- **Give as much extra fluid as the child will take** to prevent dehydration.
  - — Breastfeed frequently and for longer at each feed.
  - — If the child is exclusively breastfed, give ORS or clean water in addition to breast milk.
  - — If the child is not exclusively breastfed, give one or more of the following: ORS solution, food-based fluids (e.g. soup, rice water and yoghurt drinks) or clean water.
  - — Do not give drinks with a high sugar content.
  - — In addition to the usual fluid intake, give ORS after each loose stool:

    50–100 mL if the child is < 2 years
    100–200 mL if the child is 2 years or older.

  How to prepare and give ORS

  - — Wash your hands with soap and water.
  - — Mix 1 package of ORS with 1 litre of clean water.
  - — Do not keep the mixed ORS solution for more than 24 h.
  - — Give frequent small sips from a cup or spoon.
  - — If the child vomits, wait 10 min. Then continue, but more slowly.
  - — Continue giving extra fluid until the diarrhoea stops.
- **Continue feeding and providing normal healthy diet** to the child.
- **Give paracetamol if the child has high fever** (≥ 39 °C) that causes distress.
- Diarrhoea usually lasts for 5–7 days and up to 2 weeks.
- **Return immediately** if your child:
  - — becomes sicker (deep unresponsiveness, inactivity)
  - — is unable to drink or breastfeed
  - — drinks poorly
  - — presents fever that persists after 2–3 days
  - — has blood in the stool.
- Return after 5–7 days if your child shows none of these signs but is still not improving.

Some dehydration

- Follow diarrhoea treatment plan B (Chart 1B) or consider referral to hospital if you cannot keep the child at your health facility for the treatment plan.
- Reassess after 4 h or earlier if not taking the ORS solution or seems to be getting worse:
  - If there is no dehydration, counsel the caregivers on home treatment (Treatment plan A, see Chart 1A, p. 279).
  - If there is still some dehydration and the child does NOT drink adequately, refer to hospital.
  - If there are signs of severe dehydration, refer urgently to hospital (follow Treatment plan C, p. 283).
- If the child is restless, irritable or convulsing, check blood glucose or electrolytes if possible and refer to hospital. While waiting for referral, manage the child accordingly). If blood glucose measurement is not possible, give IV glucose or oral sugar.

Feeding

Continuation of nutritious feeding is important in managing diarrhoea:

- In the initial 4 h rehydration period, do not give any food except breast milk. Breastfed children should continue to breastfeed frequently throughout the episode of diarrhoea. If they cannot suck from the breast, consider giving expressed breast milk either orally from a cup or by nasogastric tube.
- After 4 h, if the child still has some dehydration and ORS continues to be given, give food every 3–4 h.
- All children ≥ 6 months should be given some food before being sent home.

Chart 1B. Diarrhoea treatment plan B

Treat some dehydration with ORS

▶ Give the recommended amount of ORS over 4 h.

Determine amount of ORS to give during first 4 h:

Age[a]	< 4 months	4 to < 12 months	12 months to < 2 years	2 years to < 5 years
Weight	< 6 kg	6–< 10 kg	10–< 12 kg	12–19 kg
	200–400 mL	400–700 mL	700–900 mL	900–1400 mL

[a] Use the child'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 child's weight (in kg) by 75.

If the child wants more ORS than shown, give more.

▶ **Show the caregiver how to give ORS solution:**

A teaspoonful every 1–2 min if the child is < 2 years

Give frequent small sips from a cup for an older child

Breastfeeding mothers should breastfeed whenever the child wants.

▶ **Check regularly to see whether there are problems:**

If the child vomits, wait 10 min, then continue ORS solution, but more slowly (e.g. a spoonful every 2–3 min)

If the child's eyelids become puffy, stop ORS solution, reduce the fluid intake and continue with breast milk. Weigh the child and monitor urine output.

▶ **After 4 h:**

Reassess the child and classify the dehydration status

Select the appropriate plan to continue treatment

Begin feeding the child in the clinic.

▶ **If the caregiver must leave before completing treatment:**

Show the caregiver how much ORS to give to finish the 4 h treatment at home

Counsel on home treatment (Treatment plan A, p. 279).

Severe dehydration

- Refer the child urgently to hospital for IV rehydration and close monitoring.
- While waiting for referral, start rehydration and follow diarrhoea treatment plan C (Chart 1C):
  - Start IV fluid immediately.
  - If the child can drink, give as much ORS solution as the child will take. Provide the caregiver with ORS solution to continue giving it on the way to hospital.
  - If the child is breastfed, the mother should continue breastfeeding on the way.

Note: the best IV fluid solutions for rehydration are isotonic solutions: Ringer's lactate solution (Hartmann's solution) and normal saline solution (0.9% NaCl).

DO NOT use 5% glucose (dextrose) solution or 0.18% saline with 5% dextrose solution, as they increase the risk of hyponatraemia and consequently cerebral oedema.

Diarrhoea and persistent vomiting

Vomiting in children with acute diarrhoea (gastroenteritis) is usually self-limited lasting 1–3 days.

- Consider other causes of vomiting (Table 50, p. 302).
- In children > 6 months with persistent vomiting that disrupts the oral rehydration plan and feeding, consider giving a single dose oral or IV ondansetron 0.15 mg/kg. Be aware of potential adverse effects of ondansetron:
  - Cardiac effects: caution in children at risk of developing prolongation of the QT interval (disease, medications) and those with severe electrolyte abnormalities
  - Increased transit time: look for signs of bowel obstruction (p. 304).

DO NOT give other antiemetics.

Chart 1C. Diarrhoea treatment plan C

Treat severe dehydration quickly

→ Follow the arrows. If the answer is YES, go across. If NO, go down.

START HERE

Can you give intravenous (IV) fluid immediately?

YES →

- Start IV fluid immediately. If the child can drink, give ORS by mouth while the drip is being set up. Give 100 ml/kg Ringer's lactate solution (or, if not available, normal saline), divided as follows:

Age	First give 30 ml/kg in:	Then give 70 ml/kg in:
Infants (< 12 months)	1 h[a]	5 h
Children (12 months to 5 years)	30 min[a]	2.5 h

[a] Repeat once if radial pulse is still weak or not detectable

NO ↓

- Reassess the child every 15–30 min. If hydration status is not improving, give the IV drip more rapidly. Also watch for overhydration.
- Also give ORS (about 5 ml/kg per h) as soon as the child can drink: usually after 3–4 h (infants) and 1–2 h (children).

Is IV treatment available nearby within 30 min?

YES →

- Reassess an infant after 6 h and a child after 3 h. Classify dehydration. Then choose the appropriate plan (A, B or C) to continue treatment.

NO ↓

- Refer **urgently** to hospital for IV treatment.
- If the child can drink, give the caregivers ORS solution, and show them how to give frequent sips during the trip.

Are you trained to use a nasogastric tube for rehydration?

YES →

- Start rehydration by tube (or mouth) with ORS solution: give 20 ml/kg per h for 6 h (total, 120 ml/kg).
- Reassess the child every 1–2 h:
  - If there is repeated vomiting or increasing abdominal distension, give the fluid more slowly.
  - If hydration status is not improving after 3 h, send the child for IV therapy.
- After 6 h reassess the child and classify dehydration. Then choose the appropriate plan (A, B or C) to continue treatment.

NO ↓

Can the child drink?

NO ↓

Refer URGENTLY to hospital for IV or nasogastric treatment.

Note: if possible, observe the child for at least 6 h after rehydration to be sure the caregiver can maintain hydration by giving the child ORS solution by mouth.

6.4.2 Antibiotic-associated diarrhoea

Many commonly used antibiotics can cause antibiotic-associated diarrhoea, as they change the intestinal flora. They include amoxicillin, amoxicillin/clavulanate and cephalosporins. Most cases are self-limited to within a few days. Some cases develop chronic diarrhoea: then *Clostridium difficile* is the main pathogen involved.

Diagnosis

Based on history: development of diarrhoea in a child with a recent or current course of oral antibiotics.

Treatment

Antibiotic-associated diarrhoea is usually not an indication to change antibiotics:

- Counsel caregivers on home treatment of diarrhoea (Chart 1A, p. 279).

6.4.3 Food poisoning

Food poisoning is caused by eating contaminated food. The most common causes are *Campylobacter*, *Salmonella*, *E. coli* spp. and *Staphylococcus aureus*. Symptoms can appear within a few hours but usually 12 to 48 hours after the consumption of contaminated food.

Diagnosis

Based on history:

- Persons who ate the same food are also affected
- Vomiting, diarrhoea (usually watery diarrhoea)
- Cramping abdominal pain
- Fever
- Feeling unwell.

Treatment

The disease is usually self-limited to 1–3 days.

DO NOT give antidiarrhoeal medications.

- Counsel caregivers on home treatment (Chart 1A, p. 279): give extra fluid, continue feeding/eating, know when to return to the doctor.

- Remind the family about the importance of food storage, hand hygiene and adequate cooking.

6.4.4 Dysentery (bloody diarrhoea)

Dysentery is diarrhoea presenting with frequent loose stools mixed with visible blood (not just a few smears on the surface). Dysentery is most often caused by *Shigella* (bacillary dysentery) or *Entamoeba histolytica* (amoebic dysentery, rare in children), although it can also be caused by other pathogens.

Signs and symptoms

- Frequent loose stools mixed with visible red blood.

Other findings may include:

- Abdominal pain
- Fever
- Lethargy
- Dehydration (p. 276)
- Rectal prolapse.

Investigations

Send fresh stool samples for microscopic examination and culture.

Differential diagnosis

Consider other causes: intussusception in infants (p. 304), malrotation, volvulus, colitis secondary to cow's milk allergy (p. 293), inflammatory bowel disease (p. 297), food poisoning (p. 284), Henoch-Schönlein purpura (p. 400).

Complications

Shigellosis can lead to life-threatening complications: severe dehydration (p. 282), potassium depletion, rectal prolapse, convulsions, intestinal perforation, toxic megacolon and haemolytic uraemic syndrome (p. 351).

Treatment

Most children can be treated at home with supportive care including preventing or correcting dehydration and continued feeding.

DO NOT give medications for symptomatic relief of abdominal or rectal pain or to reduce stool frequency since they may prolong the illness or lead to an invasive infection.

- Assess for signs of dehydration (p. 276) and give fluids according to severity of dehydration.
- Counsel the family to maintain a good diet (p. 81). Feeding is often difficult because of lack of appetite. Return of appetite is an important sign of improvement.
- Give zinc supplements as for watery diarrhoea (p. 278).
- Counsel caregivers on home treatment (Chart 1A, p. 279).
- Give oral ciprofloxacin 15 mg/kg twice a day for 3 days if antibiotic sensitivity is unknown. If local antimicrobial sensitivity is known, follow local guidelines. In regions with high rates of *Shigella* resistance to ciprofloxacin, give ceftriaxone or azithromycin.
- If there is a diagnosis of amoebiasis, give tinidazole or metronidazole for 5 days (see dosages in Annex 4).

Note: there is widespread *Shigella* resistance to ampicillin, co-trimoxazole, chloramphenicol, nalidixic acid, tetracycline, gentamicin and first- and second-generation cephalosporins, which are no longer effective. There is also already reported resistance to ciprofloxacin in some countries.

Follow-up

Follow up after 2–3 days of treatment, and look for signs of improvement such as absent fever, fewer stools with less blood, improved appetite. If there is no improvement, refer to hospital.

Referral

Refer urgently to hospital:

- Infants < 2 months old
- Children with severe dehydration
- Severely ill children: high fever (> 39 °C), lethargic, abdominal distension, pain and tenderness with loss of bowel sounds, convulsions, reduced consciousness, pallor, no or low urine output, severely malnourished.

Notes

6.4.5 Persistent diarrhoea

Persistent diarrhoea is diarrhoea, with or without blood, that lasts for ≥ 14 days. When there is some or severe dehydration, persistent diarrhoea is classified as "severe".

The following guidelines are for children with persistent diarrhoea *who are not severely malnourished*.

Some children with persistent or recurrent diarrhoea may have conditions that require specific management or specialist referral.

History and examination

Take a history and perform a comprehensive examination (p. 272)

Assess signs of dehydration and classify the severity of dehydration (Table 48, p. 276).

Differential diagnosis

Table 49. Differential diagnosis of persistent diarrhoea by age

Diagnosis	In favour
All ages	
Post-infectious diarrhoea (p. 291)	• Following acute gastroenteritis.
Food allergy (p. 292)	• Skin rashes • Abdominal pain, poor growth, nausea and vomiting.
Immunodeficiency (congenital or acquired)	• Clinical signs of HIV infection (p. 623) • Recurrent infections • Oral thrush.
< 6 to 12 months	
Cow's milk allergy (p. 293)	• Appearing in the first months of life • Vomiting, gastroesophageal reflux, colic, constipation, atopic dermatitis (eczema).

Diagnosis	In favour
Cystic fibrosis (p. 598)	• Persistent cough starting shortly after birth • Recurrent chest infections • Recurrent sinus infections, nasal polyps • Failure to thrive, loose greasy stools.
6 months to 5 years	
Toddler's diarrhoea (functional diarrhoea) **(p. 294)**	• Watery or loose stools ≥ 4 times a day with no other symptoms • Child growing well, gaining weight, healthy. • Associated with drinking too much juice or sugar-sweetened beverages.
Coeliac disease (gluten intolerance) **(p. 296)**	• Abdominal pain and distension, anorexia, persistent or recurrent diarrhoea • Failure to thrive or weight loss • Irritability, muscle wasting, pallor.
Lactose intolerance (p. 293)	• Associated with ingestion of milk (products) • Abdominal pain, abdominal distention, bloating, flatulence.
Giardiasis (p. 295)	• Malodourous diarrhoea and belching • Abdominal pain or cramps, flatulence, bloating • Weight loss.
> 5 years	
Irritable bowel syndrome (p. 295)	• Common in teenagers • Episodes of abdominal pain or cramping and diarrhoea that alternates with constipation.
Inflammatory bowel disease (ulcerative colitis, Crohn's disease) **(p. 297)**	• Intermittent diarrhoea, blood in stool, weight loss, fatigue • Oral/lip granulomatosis, oral ulcerations • Family history of inflammatory bowel disease.

Treatment

Assess dehydration (p. 276) and treat the child according to severity of dehydration:

- For non-severe persistent diarrhoea (no signs of dehydration), treat the child at home and ensure adequate feeding and extra fluids at home: counsel the caregivers on home treatment and adopt diarrhoea treatment plan A (p. 279).
- For severe persistent diarrhoea (some or severe dehydration), give fluids according to Treatment plan B or C, as appropriate (see pp. 281 and 283) and refer to hospital.

Note: ORS solution is effective for most children with persistent diarrhoea. In a few children glucose absorption is reduced, and when given ORS solution their stool volume increases, they become thirstier, and signs of dehydration develop or worsen. These children require admission to hospital for IV rehydration until ORS solution can be taken without worsening the diarrhoea.

- Identify specific cause of persistent diarrhoea (Table 49) and manage accordingly.

DO NOT routinely treat with antibiotics, as they are usually not effective and might prolong diarrhoea.

- Consider antibiotic therapy for children with specific infections:
  - Examine every child with persistent diarrhoea for *non-intestinal infections*, such as pneumonia (p. 184), sepsis (p. 226), urinary tract infection (p. 356), oral thrush (p. 129) and otitis media (p. 210) and treat each disease accordingly.
  - *Intestinal infections*. Treat persistent diarrhoea with blood in the stools with an oral antibiotic active against *Shigella* (p. 286). Some children may have giardia: treat with oral antibiotic (p. 295).
- Give daily supplementary multivitamins and minerals for 2 weeks. These should provide a broad range of vitamins and minerals, including at least twice the recommended daily allowances of folate, vitamin A, zinc, magnesium and copper. As a guide, the recommended daily allowance for a child aged 1 year is:
  - Folate: 50 µg
  - Zinc: 10 mg
  - Vitamin A: 400 µg
  - Iron: 10 mg
  - Copper: 1 mg
  - Magnesium: 80 mg

Feeding

Careful attention to feeding is essential for all children with persistent diarrhoea. These children may be having difficulty in digesting animal milk other than breast milk.

- Counsel the caregiver to:
  - Reduce animal milk in the child's diet for some time. Try to replace cow's milk with fermented milk products (e.g. yoghurt), which contain less lactose and are better tolerated. Try out lactose-free milk before reintroducing normal milk.
  - If still breastfeeding, continue breastfeeding and give more frequent, longer breastfeeds, day and night.
  - Give appropriate complementary foods appropriate for the child's age to ensure an adequate caloric intake. Infants aged > 4 months whose only food has been cow's milk should begin to take solid foods. Give frequent small meals, at least 6 times a day.

Follow-up

- Ask the caregivers to bring the child back for reassessment after 5 days, or earlier if the diarrhoea worsens or other problems develop.
- Fully reassess children who have not gained weight or whose diarrhoea has not improved in order to identify any cause such as dehydration or infection which requires immediate attention or admission to hospital. Those who have gained weight and who have three or fewer loose stools per day may resume a normal diet for their age.

Post-infectious diarrhoea

Persistent diarrhoea that appears in infants and young children following acute infectious gastroenteritis, regardless of the nature of the pathogen. It is caused by residual inflammation of the mucosa. It can be associated with secondary lactase deficiency, cow's milk protein intolerance and antibiotic-associated colitis. It is more common in malnourished and immunocompromised children.

Treatment

Most cases do not need a specific treatment, if the child is otherwise well.

Consider lactose-free or cow's milk-free diet (p. 293).

Food allergy and food intolerance

Most common foods that trigger allergy in children are cow's milk, egg, nuts, soy, wheat, shellfish. Symptoms appear within minutes to hours after food consumption. Most food allergies are often self-limiting.

Signs and symptoms

- Skin/mucosal involvement: urticaria, angioedema, pruritus in and around the mouth
- Abdominal pain, diarrhoea, vomiting
- Respiratory symptoms (less common): rhinitis, bronchospasm
- Poor growth, failure to thrive
- Anaphylaxis (p. 730).

Diagnosis

Based on history, examination, skin testing and specific IgE testing. Improvement after removal of the triggering food from diet supports the diagnosis.

DO NOT jump to the conclusion that there is an allergy when it is just an episode of diarrhoea.

Treatment

- If there is a high suspicion of food allergy, advise reducing or eliminating the trigger food from the child's diet.
- Counsel caregivers how to recognize emergency signs and when to seek help.
- For treatment of anaphylaxis see p. 731, and for urticaria see p. 395.
- If an allergy is confirmed, refer to specialist for food-specific immunotherapy.

The fear of food allergies should not delay the introduction of complementary feeding (p. 89) in infants at 6 months of age.

Follow-up

Look for improvement of symptoms if trigger foods were reduced or eliminated from the child's diet.

Monitor normal growth regularly at well-child visits (p. 20).

Milk allergy

Cow's milk is the most common food allergy in young children, due to the immunological response to cow's milk proteins. Goat milk or soy protein allergy are less common as they are less used. Milk allergy is less common in exclusively breastfed infants, although all the milk proteins in the mother's diet are present in her breast milk.

Signs and symptoms

- Symptoms appear within days or weeks of introducing a cow's milk-based formula
- Diarrhoea (sometimes with blood in severe disease)
- Vomiting
- Gastroesophageal reflux
- Colic
- Constipation
- Atopic dermatitis (eczema).

Diagnosis

Diagnosis is made clinically by a trial of eliminating cow's milk (or goat or soy milk, if other milks are given), by modifying the mother's diet or by changing to an extensively hydrolysed formula for a period of 2 weeks.

Treatment

- Same as for food allergy (p. 292).
- In breastfed infants, counsel to continue breastfeeding without interruption. Once the diagnosis is confirmed, advise the mother to eliminate milk from her diet.

Lactose intolerance

Intolerance to food containing lactose which is the main sugar in milk. It may be associated with lactose malabsorption. Lactose intolerance can be primary (lactase deficiency) but is more commonly secondary, following small bowel mucosa damage (acute gastroenteritis, giardiasis, coeliac disease).

Signs and symptoms

- Abdominal pain
- Flatulence, bloating and frothy watery diarrhoea after ingestion of lactose (milk and milk-containing products)
- Perianal excoriation.

Diagnosis

Based on clinical findings, consider referral to specialist for investigations to confirm the diagnosis: presence of faecal reducing substances and pH, breath hydrogen test (measurement of lactose malabsorption), challenge test with oral lactose, small bowel biopsy (for primary forms). Improvement after removing lactose from the diet supports the diagnosis.

Treatment

- Give dietary advice to reduce or eliminate lactose from the diet. Secondary lactose intolerance is usually self-limited.
- In formula-fed infants or children, consider changing to a lactose-free or extensively hydrolysed formula.
- If breastfed infants or children, advise to space feeds to 3 hourly or longer, empty breasts at each feed, and offer alternate sides for feeding.
- Reintroduce milk feeds gradually once symptoms have improved.

Toddler's diarrhoea

Also known as functional diarrhoea, or chronic nonspecific diarrhoea. Very common in children between 6 months and 3–5 years of age.

Signs and symptoms

- Diarrhoea with no other signs or symptoms
- No nocturnal diarrhoea
- Diarrhoea can be intermittent and alternated with constipation
- Sometimes associated with drinking too much juice or sugar-sweetened beverages.

Diagnosis

Based on history and no findings on examination.

Treatment

Toddler's diarrhoea is self-limiting and resolves at school age.

- Reassure the family and advise to reduce or cease sugary drinks and fruit juices.
- No other treatment is required.

Irritable bowel syndrome

Also known as chronic nonspecific diarrhoea. Similar disease to toddler's diarrhoea, with a different age presentation: children > 5 years and adolescents.

Signs and symptoms

- Episodes of abdominal pain or cramping and diarrhoea that alternate with constipation
- Associated with the consumption of juices
- May be related to anxiety, depression and other mental problems.

Treatment

- Counsel the child or adolescent and the family to increase the amount of fibre in the child's diet, exercise regularly and reduce stress levels and to reduce the consumption of drinks (e.g. fruit juices) that trigger the symptoms.

Giardiasis

The protozoan parasite *Giardia intestinalis* (or *G. lamblia*, *G. duodenalis*) causes waterborne and foodborne disease, and day-care centre outbreaks. Infection is common where there is inadequate sanitation and water supply.

Signs and symptoms

Giardiasis may be asymptomatic, or cause:

- Foul-smelling diarrhoea; initially watery, then loose greasy stools
- Belching
- Abdominal pain or cramps, flatulence, bloating
- Weight loss.

Diagnosis

Examine the stools by microscopy (serial examination of three stools).

Treatment

- Treat with oral metronidazole 7.5 mg/kg 3 times a day if cysts or trophozoites of *Giardia lamblia* are found or if there is strong clinical suspicion of giardiasis. Alternatively, treat with albendazole or tinidazole single dose (see dosages in Annex 4).
- Remind the child and family of the importance of handwashing as an important preventive measure.

Coeliac disease

Coeliac disease (gluten-sensitive enteropathy) is an inflammatory disease of the small intestine associated with intolerance to gluten (which is found in wheat, barley and rye) in genetically predisposed persons.

Signs and symptoms

- Chronic or recurrent diarrhoea, constipation, abdominal pain and distension, anorexia
- Growth failure, or weight loss, delayed puberty
- Irritability, fatigue, muscle wasting
- Mouth sores, pallor
- Rash (dermatitis herpetiformis)
- Joint and bone pain.

Investigations

On suspicion, refer to a specialist for further investigations and confirmation of diagnosis. The diagnostic standard is an intestinal biopsy, supported by IgA antibodies against tissue transglutaminase, and genetic study. Additional tests may be required to exclude associated autoimmune diseases.

Treatment

DO NOT remove gluten from the child's diet until the disease is confirmed.

- Once the disease in confirmed, provide nutritional counselling on a gluten-free diet for life.

Follow-up

Follow up regularly according to specialist treatment plan to:

- Monitor normal growth regularly at well-child visits (p. 20).
- Confirm correct diet compliance
- Detect early complications and associated diseases

Complications

Osteoporosis or iron-deficiency anaemia caused by poor dietary intake or the persistence of the malabsorption.

Inflammatory bowel disease

Inflammatory bowel disease comprises two major diseases:

- **Ulcerative colitis** which affects the colon
- **Crohn's disease** which can affect any part of the gastrointestinal system from mouth to anus.

They usually present during adolescence and are rare in children < 5 years of age.

Signs and symptoms

- Family history of inflammatory bowel disease
- Onset may be insidious
- Gastrointestinal manifestations:
  - Diarrhoea (can be bloody or intermittent)
  - Abdominal pain (chronic, right lower quadrant)
  - Tenesmus
  - Perianal disease (fistula, fissures, abscesses).
- Extraintestinal manifestations (more common in Crohn's disease):
  - Growth failure, weight loss, delayed puberty
  - Fever, fatigue
  - Joint pain and inflammation
  - Rash (erythema nodosum or pyoderma gangrenosum)
  - Oral ulcerations (aphthous stomatitis), oral or lip granulomatosis
  - Eye inflammation (uveitis, episcleritis)
  - Jaundice, liver enlargement, pancreatitis.

Investigations

- Blood analysis: anaemia, increased white blood count and platelets, increased inflammatory markers (CRP, ESR), hypoalbuminaemia, hypoproteinaemia, iron deficit
- Stool analysis: gross or occult blood, faecal calprotectin.

Referral

Refer to a specialist when inflammatory bowel disease is suspected for confirmation of diagnosis, further investigations (endoscopy, imaging) and initiation of treatment according to disease and severity: medication (glucocorticoids, aminosalicylates, anti-TNF agents, antibiotics), surgery, nutritional therapy and psychosocial support.

Follow-up

Review and follow the specialist's treatment plan.

6.4.6 Worms

Intestinal parasitic worms include roundworms, whipworms and hookworms. Pinworms are the most common in children and adolescents and do not cause serious disease. Other worms can compromise nutritional status, affect cognitive processes and lead to intestinal obstruction and rectal prolapse.

Infection occurs by eating food contaminated with eggs or larvae, or through penetration of the skin by infective larvae in the soil (hookworms). Infected people excrete helminth eggs in their faeces.

History

Depending on the worm species:

- Small, white worms in faeces that look like pieces of thread
- Large worm or large piece of worm in faeces
- Itching around the anus, particularly at night with difficulty sleeping and restlessness
- Bed-wetting (p. 361)
- Anorexia, nausea, vomiting, diarrhoea, abdominal pain or distension
- Weight loss
- Red, itchy worm-shaped rash on the skin

- History of walking barefoot
- History of travel to endemic areas
- History of eating raw/undercooked meat, pork or fish.

Investigations

- Normally no investigations necessary. Can be confirmed by stool microscopy where the worm eggs are detected (for intestinal worms)
- Pinworm eggs can be collected and examined using the "tape test" when the child wakes up by firmly pressing the adhesive side of clear, transparent cellophane tape to the skin around the anus. The eggs stick to the tape and the tape can be placed on a slide and looked at under a microscope.

Treatment

- Give a daily dose of albendazole (400 mg tab) or mebendazole (500 mg tab) for 1–3 days (see dosages in Annex 4).
  - Pinworm: 2 doses of medication with the second dose being given 2 weeks after the first dose.
  - Ascaris: 1–3 days
  - Whipworm: 3 days
  - Hookworm: 1–3 days.

Additional advice for pinworm

- Treat all household contacts and caregivers at the same time.
- Counsel on good hygiene:
  - Practise proper hand hygiene
  - Keep fingernails clean and short
  - Avoid nail-biting and scratching the area around the anus
  - Wash every morning and change underwear daily
  - Wash underwear and other clothes (including pyjamas), towels and bedding in hot water to prevent re-infection.

6.5 Vomiting

Vomiting is common in children and adolescents. It often occurs together in children with acute diarrhoea (gastroenteritis), but can also be a sign of several serious conditions which should be considered in the differential diagnosis. Accordingly, history and examination are wide-ranging.

DO NOT use antiemetics routinely in a child with vomiting.

History

- Frequency of vomiting: acute, recurrent or continuous
- Timing: in the morning, later in the day, at night, after eating or meals, with changes in posture
- Vomitus: digested food contents from the stomach, yellow, bilious (green), blood-tinged or containing blood (haematemesis)
- Associated symptoms:
  - Diarrhoea (watery, bloody or foul-smelling), blood in stool, melaena (dark, sticky faeces containing partly digested blood)
  - Abdominal pain
  - Fever
  - Projectile, non-bilious vomiting after feeds (hypertrophic pyloric stenosis, p. 155)
  - Headache, photophobia, confusion, stiff neck, ear pain
  - Dysuria, urinary frequency or flank pain
  - Respiratory symptoms (cough, difficulty in breathing)
  - Dizziness, sweating, pallor
  - Symptoms preceded by aura, e.g. sensation of flashing lights, blurred vision
  - Polyuria, polydipsia and polyphagia
- Other history:
  - Eating contaminated food or drinking freshwater, ill contacts
  - Travel
  - Previous trauma
  - Toxins or medications
  - Family history: chronic inflammatory condition, genetic condition (e.g. metabolism disorder) or liver disease.

Examination

Perform a complete physical examination and look for:

- Signs of dehydration (p. 276)
- Fever and lethargy
- Crackles on chest exam, reduced air entry, dullness to percussion (pneumonia)
- Jaundice, petechiae or purpura
- Pallor (anaemia)
- Neurological signs:
  - Altered mental status, reduced conscious state, seizures, ataxia, reduced muscle tone and strength, absent reflexes, unstable gait, focal findings on examination of cranial nerves
  - Bulging fontanelle in infants
- Acetone smell of breath.

RED FLAGS

REFER if:

- Vomiting and severe headache
- Recurrent vomiting
- Signs of bowel obstruction (e.g. bile-stained vomiting)
- Haematemesis (blood-stained vomiting)
- Reduced conscious state
- Distended abdomen
- Vomiting after head injury.

Differential diagnosis

For causes of vomiting in children and adolescents, see Table 50.

For causes of vomiting in newborns and infants < 2 months see p. 155.

Table 50. Differential diagnosis of vomiting

Diagnosis	In favour
Acute diarrhoea (gastroenteritis) **(p. 275)**	• Diarrhoea • Fever • Abdominal pain (colic).
Food poisoning (p. 284)	• Cramping abdominal pain, diarrhoea • Onset may be rapid • Other persons who ingested the same food also affected.
Non-gastrointestinal infections	• Fever and lethargy • Signs and symptoms of acute otitis media (p. 210), sinusitis (p. 217), urinary tract infection (p. 356), meningitis (p. 235), pneumonia (p. 184), pertussis (p. 206).
Feeding problems (p. 94)	• Infants and young children • Overfeeding, errors in preparing food (formula).
Milk allergy (p. 293)	• Appears in the first year of life • Gastroesophageal reflux, colic, constipation, atopic dermatitis (eczema).
Food allergy (p. 292)	• Skin rashes, abdominal pain, poor growth, nausea.
Lactose intolerance (p. 293)	• Associated with ingestion of milk and milk products • Abdominal pain, abdominal distention, flatulence, diarrhoea.
Dysentery (p. 285)	• Blood in stools, fever.
Gastroesophageal reflux disease (p. 306)	• Most common in infants, although it can appear at any age in life. • Effortless regurgitation or vomiting after feeding or eating • Respiratory symptoms (chronic cough, stridor, wheeze) • Infants may be irritable and present with back arching • Haematemesis • Growth failure.

Diagnosis	In favour
Giardiasis (p. 295)	• Malodourous diarrhoea and belching, abdominal pain or cramps, flatulence, bloating, weight loss.
Inflammatory bowel disease (p. 297)	• Typically adolescent age • Intermittent diarrhoea, blood in stool, weight loss, fatigue • Oral/lip granulomatosis, oral ulcerations • Family history of inflammatory bowel disease.
Acute appendicitis	• Sharp pain in right lower quadrant • Rigid abdomen, abdominal guarding and tenderness, peritonitis • Fever, nausea, constipation or diarrhoea.
Head injury (p. 494)	• History of head injury • Amnesia • Bruises or other signs of trauma.
Migraine (p. 467)	• Typically adolescent age • Headache, photophobia • Nausea, abdominal pain • Aura, e.g. sensation of flashing lights, blurred vision.
Meningitis (p. 235)	• Fever • Headache • Petechiae or purpuric rash • Neck stiffness, bulging fontanelle (infants) • Convulsion(s).
Pregnancy (p. 693)	• Sexually active adolescent girls • Delayed or missed period • Nausea and vomiting in the morning • Lower abdominal pain.
Eating disorders (p. 552)	• Typically adolescent age • Self-induced vomiting to prevent weight gain.
Diabetic ketoacidosis (p. 602)	• Frequent vomiting and acute abdominal pain • Acetone smell on breath • Polyuria, polydipsia and polyphagia • Decreased level of consciousness.

Diagnosis	In favour
Motion or travel sickness (p. 305)	• Associated with passive movements in a car or ship during travel
Less common conditions. Refer for further investigations to confirm the suspected diagnosis.	
Bowel obstruction (volvulus, malrotation, intussusception, strangulated hernia)	• Bilious vomiting • Proximal obstruction: vomiting, minimal abdominal distension • Distal obstruction: abdominal distension, vomiting occurring later • Cramping abdominal pain, distension and no flatus, abdominal guarding and tenderness • Peristaltic waves may be visible through the abdominal wall.
Inborn error of metabolism (p. 106)	• Newborns and infants • Nonspecific symptoms: poor feeding, lethargy, hypotonia, convulsions, breathing problems • Hypoglycaemia, acidosis.
Renal tubular acidosis	• Failure to thrive, low appetite. • Polyuria • Hypotonia.
Subdural haemorrhage	• History or other signs of child maltreatment • History of trauma or neurosurgery.
Brain tumour	• Persistent vomiting/feelings of nausea (over a 2-week period) • Recurring headache (over a 4-week period, particularly on waking) • Abnormal eye movements, blurred/double vision • Fits or seizures • Behavioural change • Problems with balance, walking, coordination • Abnormal head position (such as a head tilt).

Referral

- Refer urgently (p. 782) if you suspect:
  - Bowel obstruction
  - Testicular torsion (p. 369)
  - Appendicitis
  - Meningitis (p. 235)
  - Brain tumour
  - Diabetic ketoacidosis (p. 602).

6.5.1 Motion or travel sickness

Motion or travel sickness can occur when travelling by car, bus, train, boat or airplane or during amusement park rides, and also during video games. It is caused by a conflict between the visually perceived movement and the movement sensed by the balance and position sensors in the brain.

History

- Nausea, vomiting, dizziness during travelling
- No symptoms when not travelling.

Treatment

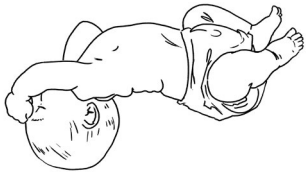
- Give advice to the child or adolescent and the family:
  - Look straight ahead at a fixed point, such as the horizon
  - Breathe fresh air while travelling if possible
  - Close eyes and breathe slowly while focusing on breathing
  - Distract yourself by talking, listening to music or singing songs
  - Break up long journeys to get some fresh air, drink water or take a walk, if possible
- If the measures above are not sufficient, give oral promethazine 0.5 mg/kg/dose. It should be taken the night before a long journey or 1–2 hours before a short journey to prevent motion sickness.

6.5.2 Gastroesophageal reflux disease

Gastroesophageal reflux (passage of gastric content into the oesophagus) is a normal physiological process. Gastroesophageal reflux may be qualified as a disease when gastroesophageal reflux causes troublesome symptoms or complications. Most common in infants, although it can appear at any age in life.

Signs and symptoms

- Effortless regurgitation or vomiting after feeding or eating
- Irritability in infants and possible episodes of back arching, called Sandifer syndrome (see illustration)
- Failure to thrive
- Respiratory symptoms (chronic cough, stridor, wheezing).



Sandifer syndrome ("dystonic neck posturing"): back arching in infants with gastroesophageal reflux disease

Investigations

- Investigations are not necessary for gastroesophageal reflux and mild cases of gastroesophageal reflux disease responsive to treatment

DO NOT use a diagnostic trial of proton pump inhibitors in infants

- Refer for investigations (oesophageal pH and impedance monitoring, endoscopy, barium contrast study) in more severe cases or to exclude other diagnosis.

Treatment

- Reassure the family that gastroesophageal reflux with or without regurgitation or vomiting and no complications is normal. Regurgitation or vomiting is usually self-limiting and will resolve with age.

DO NOT routinely give antireflux medication.

Step 1

- Avoid overfeeding by adjusting feeding frequency and volume.
- Give milk-thickening agents (e.g. rice cereal).
- Advise to continue breastfeeding.

- Position upright when feeding and after feeding.
- Older children and adolescents may benefit from losing weight, and smoking and alcohol abstinence.

Step 2 (if no improvement after implementation of step 1)

- Consider elimination of cow's milk in maternal diet for breastfed infants OR use of a hydrolysed infant formula for 2–4 weeks.

Step 3 (if no improvement after implementation of steps 1 and 2)

- Refer to specialist.
- If referral not possible, consider acid suppressants such as omeprazole 1 mg/kg once a day.

6.6 Abdominal pain

Abdominal pain in children is a common complaint that has a broad range of causes which change with age. A comprehensive history and physical examination will assist with the differential diagnosis (Table 51, p. 310).

History

- Onset, frequency, duration and time of day
- Offset of the pain: what makes the pain better
- Location of the pain (ask the child to point to where it hurts most): has the pain shifted, become diffuse or more confined
- Characteristics of the pain: acute (single episode that lasts from hours to days; often localized, sharp and stabbing) or chronic (lasts days to months; usually dull, diffuse and poorly localized; there may be pain-free intervals)
- Associated symptoms:
  - Nausea, vomiting, diarrhoea, constipation, abdominal distension, weight loss
  - Irritability, fever, cough, headache, sore throat
  - Urinary symptoms: frequency, dysuria, haematuria
  - Presence of vaginal discharge, menstruation history (in older children and adolescent girls)
- Other history:
  - Abdominal trauma, history of similar symptoms or chronic illness, travel and dietary history
  - Social history: psychological factors (e.g. depression, abuse, attention deficit disorder, oppositional disorder), weaning, toilet training, start of school or other causes of stress; situation at home and school, relationships with family and peers, HEEADSSSS assessment in adolescents (p. 670).

Examination

Look for:

- Abdominal distension, abdominal masses
- Tenderness and involuntary guarding on palpation, location, rebound tenderness, pain on movement, rigid abdomen, absent bowel sounds on auscultation

- Signs of pneumonia: reduced air entry, dullness to percussion and crackles on chest exam
- Growth and pubertal status
- Genital or testicular abnormalities: imperforate hymen in girls, testicular torsion or incarcerated hernia in boys.

Rectal and vaginal examinations are not routinely performed in children.

Investigations

! An acute abdomen is a surgical emergency and referral should not be delayed because of additional tests.

Investigations should be guided by the clinical picture and can include:

- Urinalysis (point-of-care test) in all children
- Pregnancy test (urine or serum beta-hCG) for adolescent girls, (miscarriage, ectopic pregnancy)
- Blood analysis:
  - Full blood count and inflammation markers (ESR, CRP) (infection and inflammation)
  - Haemoglobin to evaluate anaemia (coeliac disease, inflammatory bowel disease)
  - IgA antibodies against tissue transglutaminase and total IgA (coeliac disease)
  - Liver function test (viral hepatitis or cholecystitis)
  - Hepatitis A-specific IgM antibody, hepatitis B serology or viral load, hepatitis C serology or viral load, hepatitis D and E serologies (viral hepatitis)
  - Amylase and lipase (acute pancreatitis)
- Stool microscopy and culture in bloody diarrhoea
- Microscopy and culture for *Neisseria gonorrhoeae*, *Chlamydia trachomatis* and other sexually transmitted infections (p. 688) from vaginal fluid secretions
- Ultrasound to evaluate for abdominal, testicular or pelvic masses, bowel obstruction, appendicitis, cholelithiasis/cholecystitis, renal tract anatomical abnormalities, kidney stones

- Focused abdominal sonography for trauma (FAST) to evaluate blunt abdominal trauma in haemodynamically unstable children.

Differential diagnosis

Table 51. Differential diagnosis of abdominal pain

Diagnosis	In favour
Common causes	
Functional abdominal pain (p. 314)	• Periumbilical pain (distractible) • Normal examination • Family history of functional disorder (irritable bowel syndrome, mental illness, migraine, anxiety) • Typically older children and adolescents.
Acute diarrhoea (gastroenteritis) **(p. 275)**	• Diarrhoea, fever, vomiting, low appetite • Signs of dehydration.
Constipation (p. 315)	• Stools < 3 times in a week or difficult to push out and larger than usual • Dry, hard or lumpy stool • Palpable faeces on abdominal examination.
Urinary tract infection (p. 356)	• Fever • Dysuria, haematuria, urinary frequency.
Food allergy (p. 292)	• Skin rashes • Nausea, vomiting • Poor growth.
Acute appendicitis	• Sharp right lower quadrant pain • Rigid abdomen, abdominal guarding and tenderness, peritonitis • Fever, nausea, low appetite, vomiting.
Mesenteric adenitis (p. 314)	• Continuous pain in right lower quadrant • Fever, nausea • Symptoms of a common cold, sore throat, cervical lymph nodes.

Diagnosis	In favour
Primary dysmenorrhoea (p. 701)	• Menstruating adolescent girls • Cramping or pain in the lower abdomen before and during period.
Pneumonia (p. 184)	• Fever • Cough, difficulty in breathing, fast breathing, chest wall indrawing, grunting, nasal flaring • Chest pain.
Abdominal trauma	• History of blunt or penetrating abdominal trauma.
Lactose intolerance (p. 293)	• Associated with ingestion of milk (products) • Abdominal pain or distention, bloating, flatulence, frothy watery diarrhoea, perianal excoriations.
Less common causes	
Intussusception	• Infant or young child • Abdominal mass, vomiting • Looking ill • Sudden episodes of crying/pain with pallor and floppiness • Blood and mucus in stools (late sign).
Coeliac disease (p. 296)	• Chronic or recurrent diarrhoea • Abdominal pain and distension, low appetite • Failure to thrive, weight loss • Irritability, muscle wasting, pallor.
Peptic ulcer disease (p. 317)	• Epigastric pain • Dull pain related to eating meals • Usually in adolescents.
Inflammatory bowel disease (p. 297)	• Intermittent diarrhoea, blood in stool, weight loss, fatigue • Family history of inflammatory bowel disease (Crohn's disease, ulcerative colitis).

Diagnosis	In favour
Bowel obstruction	• Proximal obstruction: vomiting with minimal distension • Distal obstruction: distension, with vomiting occurring later • Cramping abdominal pain, distension and no flatus, abdominal guarding and tenderness • Peristalsis waves may be visible through the abdominal wall.
Diabetic ketoacidosis (p. 602)	• Polyuria, polydipsia, acetone breath • Vomiting, abdominal pain, low appetite • High blood glucose • Urinalysis positive for glucose and ketones.
Incarcerated hernia (p. 375)	• Nonreducible tender swelling at the site of an inguinal or very rarely umbilical hernia, with pain that exacerbates on coughing • Nausea, vomiting • Signs and symptoms of bowel obstruction (see above).
Viral hepatitis (p. 415)	• Fatigue, low appetite • Jaundice with dark urine • Tender right upper quadrant, enlarged liver.
Henoch-Schönlein purpura (p. 400)	• Palpable purpura • Arthritis, arthralgia • Abdominal pain • Haematuria, proteinuria, hypertension.
Testicular torsion (p. 369)	• Severe pain in genital area that may radiate to the lower abdomen • Nausea, vomiting • Acute swelling in one side of the scrotum • Testis extremely tender to touch • Cremasteric reflex usually absent.
Familial Mediterranean fever (p. 267)	• Recurrent fever (1–4 days) every week or month • Painful swollen joints • Erysipelas-like rash • Chest pain (pleuritis).

Diagnosis	In favour
Kidney stones/ renal colic (p. 360)	• Dysuria • Abdominal or flank pain, usually intense and colicky • Microscopic or macroscopic haematuria.
Poisoning (p. 748)	• History of exposure to poisons or drugs.
Acute pancreatitis	• Unwell child with hypotension • Nausea, vomiting, acute onset of epigastric pain radiating to the back, discoloration around umbilicus or flanks • Young child: irritability, abdominal distension.
Cholelithiasis, cholecystitis	• Right upper quadrant pain and tenderness • Murphy's sign positive (stops breathing during deep palpation below the right rib cage) • Pain often after eating (fatty foods) • Nausea.
Ovarian torsion	• Adolescent girls • Abrupt severe abdominal pain, constant or colicky • Nausea, vomiting.
Pelvic inflammatory disease	• Sexually active adolescent girls • Pain and tenderness in the lower abdomen • Vaginal discharge, vaginal bleeding • Pain during or after intercourse • Fever.
Pregnancy complications	• Sexually active • Known pregnancy, delayed or missed period.
Abdominal tumour	• Weight loss • Abdominal mass on palpation.

Referral

Refer urgently to hospital (p. 782) if suspicion of:

- Acute appendicitis
- Acute pancreatitis
- Bowel obstruction
- Cholelithiasis, cholecystitis

- Intussusception
- Pregnancy complications
- Testicular torsion
- Ovarian torsion
- Abdominal tumour.

▶ Manage the pain (p. 508).

▶ Insert an IV line and give pre-referral fluids if dehydrated.

6.6.1 Functional abdominal pain

Functional abdominal pain typically affects children and adolescents between 5 and 14 years of age.

Signs and symptoms

- Periumbilical pain (distractible)
- No associated clinical features
- Family history of functional disorder (irritable bowel syndrome, mental illness, migraine, anxiety)
- Stressors or triggers, e.g. family disharmony, parental separation, domestic violence, being bullied, loss of a friend, pet or love interest
- Normal examination.

Treatment

▶ Reassure the child or adolescent and their family.

▶ Advice on healthy diet (p. 95), regular physical activity (p. 103) and ways to reduce anxiety: adequate sleep, relaxation and visualization techniques.

Follow-up

Follow up within 4 weeks. Refer for psychological support if no improvement.

6.6.2 Mesenteric adenitis

Mesenteric adenitis refers to inflammation of the lymph nodes in the mesentery (abdomen). It usually occurs in children presenting with a respiratory infection such as a common cold. It is a self-limiting process.

History

- Continuous pain in right lower quadrant
- Fever, nausea; usually no vomiting
- Symptoms of a common cold, sore throat, cervical lymph nodes.

Examination

- Pain on abdominal palpation in right lower quadrant.
- Rule out acute appendicitis (p. 274). Pain usually resolves with analgesia in mesenteric adenitis. Refer if you cannot confidently rule out acute appendicitis.

Treatment

- Give paracetamol or ibuprofen as required for pain control or if the child has high fever (≥ 39 °C) that causes distress (Counselling box 25, p. 230).
- Explain that it is a self-limiting process. Ask caregivers to return in 2–3 days if the abdominal pain persists or earlier if the child worsens.

6.6.3 Constipation

Frequency in passing stools varies from child to child, from several times a day to once every few days. Infants pass stools more frequently than older children.

In infants, constipation is uncommon but can present in those formula fed. Most children will have a functional constipation without an underlying identifiable cause, but it is important to consider organic constipation due to metabolic disorders, hypothyroidism, hypercalcaemia, diabetes mellitus, cystic fibrosis, neurological tumours, cerebral palsy, colorectal anatomical anomalies.

History

- Stools < 3 times in a week
- Difficulty pushing out stools and stools larger than usual
- Dry, hard or lumpy stool
- Bleeding associated with hard stool
- Straining and distress when passing stools
- Faecal incontinence (overflow)
- Poor diet.

Examination

- Soft abdomen with palpable faeces usually in left lower quadrant
- Children with functional constipation: normal examination, with or without anal fissure
- Signs of impaction: hard mass in the lower abdomen and soiling from overflow
- Children with organic constipation may present anatomical anal anomalies, abdominal masses or distention, hypotony, anomalies in lower extremities and lumbosacral area.

Treatment

- Counsel caregivers on supportive care of constipation at home (Counselling box 29) and follow up in 4 weeks.
- If supportive care at home is insufficient, consider adding oral osmotic and lubricant laxatives (see dosages in Annex 4):
  - Infants 1–12 months: iso-osmotic laxative (polyethylene glycol) or lactulose
  - Children: iso-osmotic laxative (polyethylene glycol) or lubricant (paraffin oil). Do NOT give paraffin oil to young children and those at risk of aspiration, e.g. gastroesophageal reflux disease, problems with swallowing
  - Treatment is usually required on a long-term basis (months). Reassure caregivers that this is safe.
  - Adapt medication to achieve 1 soft stool per day.

DO NOT give suppositories or enemas rectally.

- Treat anal fissures with topical petroleum jelly to relieve pain.
- If there are signs of impaction, give oral polyethylene glycol at high doses 0.5–0.75 g/kg/dose twice a day for 3–5 days, followed by a maintenance dose 0.2–0.8 g/kg/dose once a day for several weeks. Inform the caregivers that the treatment can initially increase symptoms of soiling and abdominal pain.

Follow-up

Ask the caregivers to return after 4 weeks, or within 2 weeks after disimpaction treatment. Refer if no improvement for further assessment (anatomical abnormalities, Hirschsprung's disease).

Counselling box 29. Home treatment of constipation

How to care for your child with constipation at home

Remember to:

- Make sure your child drinks enough.
- In breastfed infants, continue to breastfeed whenever your child wants.
- Ensure your child exercises regularly and gets enough sleep.
- Provide regular meals with high-fibre foods.
- Reduce cow's milk intake as it may worsen constipation in some children.

Support your younger child in going to the toilet:

- Install a footstool to ensure that your child's knees are higher than the hips. Encourage your child to lean forward, put elbows on knees and bulge out the abdomen. Place a toilet ring over the toilet seat if needed.
- Toilet sits up to 5 minutes, three times a day, after meals.
- Praise your child for sitting on the toilet.
- Keep a visible chart with stickers indicating the frequency of passing stools to motivate your child.

Referral

When you suspect an underlying cause of constipation based on history and examination, refer for further assessment and management.

6.6.4 Peptic ulcer disease

Medications, *H. pylori* infection or major stress may lead to peptic ulcer disease with ulcers on the inside of the stomach and upper intestine.

History

- Waking up due to stomach pain
- Medications such as corticosteroids or nonsteroidal anti-inflammatory drugs
- Major stress

- Young children: irritability, vomiting with or without blood
- Older children and adolescents: epigastric pain several hours after eating.

Investigations

- Refer to specialist for endoscopy to confirm the diagnosis of peptic ulcers and for gastric biopsy to test for *H. pylori* infection.

DO NOT perform urea breath test for *H. pylori* or *H. pylori* stool antigen test for initial diagnosis.

Treatment

- Treat the underlying cause in cooperation with the specialist:
  - — Discontinuation of medication
  - — If *H. pylori* infection: refer to national guideline for first-line regimen drugs and dosing for eradication of *H. pylori*. Treatment consists of 2 antibiotics (typically 2 of the following: amoxicillin, clarithromycin and metronidazole) and 1 proton pump inhibitor for 14 days. Explain to the family the importance of treatment compliance.
- Give proton pump inhibitors such as omeprazole 1 mg/kg once a day to relieve the pain and promote ulcer healing.

Follow-up

In children with *H. pylori* infection, determine treatment success at least 4 weeks after completion of treatment, by urea breath test or *H. pylori* stool antigen test. Remember that the child should be off proton pump inhibitor for 2 weeks and antibiotics for 4 weeks before testing.

6.7 Chest pain

Chest pain is a term which has different concepts in different cultures, but is mostly used differently from adult disease. It often provokes fear and anxiety in children or adolescents and their families, who tend to think of heart problems. However, most children and adolescents complaining of chest pain do not have a cardiac or other serious condition (Table 52, p. 321).

History

- Characteristics of the pain:
  - Onset: acute (often respiratory or cardiac), chronic (often idiopathic, musculoskeletal or psychogenic)
  - Type: sharp, burning sensation
  - Intensity
  - Localized (often musculoskeletal or pleural) or diffuse
  - Radiation: does it radiate anywhere (uncommon in children)
  - Duration
  - Pain increasing with cough or exercise (respiratory or musculoskeletal), or swallowing or eating (gastrointestinal)
  - Offset: when does the pain disappear, what makes it disappear
- Associated symptoms: fever, nausea, vomiting, regurgitation, sweating, palpitations, syncope, cough, fatigue
- Trauma
- Choking or foreign body aspiration
- Anxiety, school or family difficulties or conflicts
- History of cardiac or respiratory disease, cardiac surgery, Kawasaki disease, sickle cell anaemia
- Medication intake, e.g. nonsteroidal anti-inflammatory drugs
- Family history of congenital cardiac disease, sudden infant death syndrome, or hereditary diseases associated with structural cardiopathy.

Examination

Take vital signs: heart rate, respiratory rate, blood pressure, oxygen saturation, temperature.

Perform a complete physical examination (p. 12) and look for:

- Pallor, cyanosis
- Oedema
- Capillary refill time longer than 2 s
- Poor or absent axillary and femoral pulses
- Arrhythmia, tachycardia or bradycardia
- Swelling, asymmetrical bruises on the chest wall
- Pain on palpation of junction of sternum with ribs
- Liver enlargement, epigastric tenderness
- Friction rub, murmur, arrhythmia, distant sounds
- Respiratory distress (breathing fast, chest indrawing)
- Hypoventilation, wheezing, crackle
- Skin rash, oral ulcers.

Investigations

Children and adolescents with a clear cause and normal examination or findings consistent with musculoskeletal or gastrointestinal causes do not require further investigation.

Depending on the history and clinical presentation:

- Chest X-ray for chest trauma, history of choking, or if you suspect pneumothorax, severe pneumonia with complications, acute chest syndrome in sickle cell disease
- Electrocardiogram for syncope or palpitations, pain exacerbated by exercise, medical or family history of cardiac disease, high anxiety or if you suspect a cardiac cause
- Refer for echocardiogram or further investigations if you suspect a cardiac cause or when a clear diagnosis is not reached.

Differential diagnosis

Table 52. Differential diagnosis of chest pain

Diagnosis	In favour
Idiopathic	• Unknown origin • Other causes excluded.
Musculoskeletal (p. 323)	
Trauma	• History of trauma • Bruising, rib fracture and major intrathoracic injuries.
Muscle strain	• History of trauma or overuse (sport, chronic cough).
Costo-chondritis	• Usually unilateral, often affecting > 1 joint between sternum and ribs • Pain usually at rest, increasing with deep inspiration • Pain reproducible on palpation.
Tietze syndrome	• Inflammation of joints between sternum and ribs, often only 1 affected • Visible swelling and pain reproducible on palpation.
Slipping rib syndrome	• Hypermobile costal cartilage of the lower ribs shifts position • Intermittent sharp pain followed by constant pain (mild to severe, up to weeks) • Pain exacerbated by postures, movement, activities.
Respiratory	
Asthma (p. 587)	• History of episodes of shortness of breath and wheeze • Perception of chest tightness • Cough, shortness of breath, wheezing, can be exercise-induced.
Pneumonia (with or without pleural effusion) **(p. 184)**	• Cough, fast breathing, lower chest wall indrawing • Fever • Pain with inspiration.

Diagnosis	In favour
Pneumothorax (p. 324)	• Primary pneumothorax: tall and thin adolescent • Secondary pneumothorax: history of trauma or bronchospasm/asthma • Sudden pain and shortness of breath, decreased chest movement with respiration on one side.
Pleuritis or pleurisy (p. 323)	• Inflammation of the pleura, usually caused by a virus, self-limiting • Pain associated with inspiration and cough • Low-grade fever.
Pleurodynia (p. 323)	• Coxsackie virus (most commonly) • Pleuritis (see above) • Sharp and spasmodic chest pain • Oral ulcers, rash on palms and soles.
Acute chest syndrome (p. 616)	• Complication in children with sickle cell disease • Fever, cough, fast-breathing, wheezing, retractions.
Gastrointestinal	
Oesophagitis (see GERD, p. 306)	• Epigastric or retrosternal pain, worse when eating • History of gastroesophageal reflux, but also associated with medicines or allergy • Can present with regurgitation, burning sensation, vomiting, irritability (infants), respiratory symptoms (chronic cough, stridor, wheezing).
Foreign body ingestion (p. 505)	• Sudden onset of symptoms • Pain or reluctance to swallow, drooling.
Cardiac (p. 324)	
Arrhythmia (p. 335)	• Arrhythmia on auscultation • Sometimes associated with sweating, palpitations, syncope.

Diagnosis	In favour
Pericarditis	• Viral, other infectious causes or idiopathic • Retrosternal pain worse when lying and improving when seated leaning forwards • Fever • Pericardial friction rub, tachycardia • Distant heart sounds when effusion.
Myocarditis	• Often viral causes • Fever • Myalgia, malaise • Respiratory distress • Tachycardia out of proportion to the degree of fever • Signs of cardiogenic shock, arrhythmias, palpitations, heart failure (dyspnoea, liver enlargement).
Ischaemia	• Rare in children; can be associated with congenital heart diseases, Kawasaki disease (p.252) • Oppressive precordial pain, sometimes radiating, of short duration (minutes), exacerbated with exercise and fever, improving with rest.
Psychogenic	
Anxiety (p. 534) or other psychiatric disorders	• More common in adolescents • History of fear, anxiety, often triggered by stress • Fast and deep breathing (hyperventilation) • Chest tightness • Tingling or spasms in lips, hands or feet, dizziness.

Treatment

- Treat based on the underlying cause (see page references in Table 52).
- Some causes of chest pain are self-limiting (sometimes might last weeks): idiopathic chest pain, pleuritis, pleurodynia, mild trauma, muscle strain (rest), costochondritis, Tietze syndrome, slipping rib syndrome.
- Give paracetamol or ibuprofen as required for pain control (p. 508). Choose ibuprofen when an anti-inflammatory effect is desired (e.g. in costochondritis).

- For self-limiting conditions, reassure the child and the family, explain the course of the disease (expected improvement in days/weeks), counsel on home treatment and how to provide supportive care:
  - Give paracetamol or ibuprofen as required for pain control or if the child has high fever (≥ 39 °C) that causes distress (p. 228).
  - Avoid movements and activities that provoke pain.
  - Return after 7 days, or earlier if the child's condition worsens.

Referral

- Stabilize and refer to hospital urgently (p. 783) if suspected:
  - Pericarditis
  - Myocarditis
  - Cardiac ischaemia
  - Arrhythmia
  - Acute chest syndrome
  - Pneumothorax (for life-threatening tension pneumothorax, see how to perform needle thoracocentesis p. 797)
  - Severe chest trauma.

6.8 Heart murmur

Heart murmurs are relatively common in children and adolescents and often found on routine child health checks. Although most heart murmurs are innocent, others may indicate an underlying cardiac defect. Known heart conditions are discussed in Chapter 7, p. 584.

Differentiate between an innocent or pathological murmur based on characteristics at auscultation (Table 53), detailed history and examination.

Most heart murmurs are innocent and do not need referral.

Refer immediately to hospital if the child has signs of cyanosis or cardiac failure.

History

- Family history of congenital heart disease, sudden infant death syndrome, or hereditary diseases associated with structural cardiopathy
- Prenatal ultrasound findings
- Known heart murmur or a known heart condition
- Signs of heart failure or decreased exercise tolerance depending on age: feeding problems, sweating, fatigue, failure to thrive, syncope, chest pain.

Examination

Take vital signs including oxygen saturation and heart rate, and check capillary refill time. Perform a complete physical examination (p. 12) and look for:

- Characteristics of the murmur: timing, intensity, associated sounds and response to inspiration and change in position
- Arrhythmia, tachycardia or bradycardia
- Weak or absent axillary and femoral pulses
- Signs of heart failure: tachycardia, breathing fast, cyanosis, displaced apex beat, enlarged liver, oedema. In infants, symptoms may be more prominent during feeding
- Pallor.

Table 53. Characteristics of innocent and pathological heart murmurs

Characteristics	Innocent	Pathological
Timing	Short systolic (not whole systolic)	Systolic or diastolic
Intensity	Soft (grade 1–2)	Loud (grade 3–6)
Associated sounds	None	Clicks, thrills, gallop rhythm
Response to inspiration	Louder after inspiration	No change
Response to change in position	Softer when upright compared with supine	No change

Referral

- Refer urgently to hospital if the child has signs of cyanosis, heart failure, weak pulses on palpation, abnormal vital signs.
- Refer to the paediatric cardiologist for further investigations if:
  - Characteristics of pathological murmur or if a pathological murmur cannot be excluded
  - History of an abnormal fetal echocardiogram
  - Underlying disease associated with increased risk of heart disease
  - Infant < 12 months.

6.8.1 Innocent murmur

Innocent murmurs can be found in healthy children during a routine examination in infancy or childhood (peak around 5 years of age). They result from minor turbulence in the blood flow.

Signs and symptoms

- Murmur (often louder and more easily detected during a febrile illness) on heart auscultation:
  - Still's: musical vibratory systolic murmur along left sternal border (young children)
  - Pulmonary flow: soft blowing murmur at upper left sternal border (older children)

  - — Peripheral pulmonary stenosis: same as pulmonary flow but radiates to back (resolves by 3–6 months)
  - — Carotid bruit: 2/6 intensity systolic murmur above clavicles, along carotids (all ages)
  - — Venous hum: continuous murmur above or below clavicles; intensity changes with rotation of head and compression of jugular vein; disappears when supine (young children)
- No additional symptoms
- No pathological findings on examination.

Treatment

- Reassure the family and explain that innocent heart murmurs do not present any risk for the child and do not need further investigation. Most cases resolve spontaneously.
- If you are unsure whether this is an innocent murmur, re-examine the child (when fever resolves if any or in 2–4 weeks) or refer for further assessment. If the murmur characteristics change to pathological, refer for further assessment.

6.8.2 Pathological murmur

Common causes of pathological murmur in children and adolescents are:

- Congenital heart disease (p. 159)
- Mitral regurgitation due to rheumatic heart disease (p. 330), mitral valve prolapse, myocarditis (p. 227), infective endocarditis (p. 329), or heart failure (p. 328)
- Pericarditis: characteristic pericardial friction rub (p. 227).

All children presenting with a potentially pathological murmur need further investigations. Depending on the setting, you may directly refer to a specialist, or perform a chest X-ray and electrocardiogram prior to referral. Depending on the clinical status of the child, the referral needs to be urgent or can be a scheduled appointment.

Heart failure

Heart failure can be a sign of a decompensation of a pre-existing condition such as congenital heart disease (presenting usually in the first months of life), acute rheumatic fever, cardiac arrhythmia, myocarditis, suppurative pericarditis with constriction, infective endocarditis, acute glomerulonephritis, severe anaemia, severe pneumonia and severe malnutrition. Heart failure can be precipitated or worsened by fluid overload in vulnerable children such as those with malnutrition, especially when large volumes of IV fluids are given.

History

Depending on the child's age:

- Difficulty in breastfeeding
- Sweating
- Failure to thrive in infants
- Shortness of breath during exercise or activity
- Tiring or fainting during exercise or activity.

Examination

Take vital signs including oxygen saturation. Perform a physical examination (p. 12) and look for:

- Cyanosis (pale grey or blue skin colour), differential cyanosis: saturation in the feet less than in the right hand
- Weak femoral pulses
- Fast breathing and respiratory distress, especially when feeding in infants
- Heart auscultation: heart murmur (in some cases), loud second heart sound or gallop rhythm, tachycardia or bradycardia, apex beat displaced to the left
- Lung auscultation: fine crackles in the bases
- Enlarged palpable liver
- Raised jugular venous pressure in older children and adolescents
- Oedema in the hands, ankles or feet, or face (around the eyes)
- Delayed capillary refill time
- Poor urine output.

Treatment and referral

Refer urgently all children with suspected or confirmed heart failure. Before and during referral:

- Give oxygen if respiratory distress, central cyanosis or low oxygen saturation
- Avoid giving IV fluids if possible
- Support the child or adolescent in a semi-seated position
- Relieve any fever with paracetamol to reduce the cardiac workload.

Follow-up

- For care of the child or adolescent with congenital or acquired heart disease, see p. 584.

Infective endocarditis

Infective endocarditis is an infection of the endocardium and heart valves with the formation of thrombus and bacterial vegetations. The most common organisms are staphylococci and streptococci, but other organisms can also occasionally cause it. It is often a complication of pre-existing valvular heart disease.

History

Risk factors for infective endocarditis:

- Congenital heart disease (p. 159)
- Central venous catheters or intracardiac devices, e.g. prosthetic and bioprosthetic valves, implantable cardioverter defibrillators
- Rheumatic heart disease (p. 330).

Signs and symptoms

- Low-grade fever lasting longer than 7 days (subacute presentation) or high fever (acute presentation)
- Heart murmur, underlying heart disease
- Unexplained weight loss
- Fatigue
- Enlarged spleen
- Pallor (anaemia)

- Joint pain, muscle pain
- Petechiae
- Finger clubbing
- Splinter haemorrhages in nail beds.

Investigations

Will normally be done in the hospital after referral:

- Minimum of 3 blood cultures obtained from different venepuncture sites within 24 hours (or within an hour if child is critical)
- Echocardiogram
- Other tests may be needed such as blood inflammatory markers, haemoglobin, urinalysis.

Referral

Refer urgently to hospital if suspected infective endocarditis for confirmation of diagnosis based on diagnostic criteria (modified Duke criteria), IV antibiotics (2 to 6 weeks of antibiotics) and supportive therapy. Surgical intervention may be needed.

Prevention

Children and adolescents who have had infective endocarditis are at high risk of suffering a new episode. See p. 585 for prophylactic measures and counsel the family.

Rheumatic heart disease

Rheumatic heart disease is an abnormal immune reaction to group A streptococcal infections in young people. It follows acute rheumatic fever (p. 241). Severe or recurrent episodes of acute rheumatic fever cause damage to the heart valves (most commonly the mitral valve, followed by aortic valve, rarely tricuspid valve).

History and examination

- History of recurrent throat infections (p. 241) or acute rheumatic fever (p. 241)
- Symptoms of heart failure: breathlessness, fatigue, oedema
- Cardiac murmur, cardiomegaly or pulmonary oedema.

Investigations

Refer for echocardiography.

Differential diagnosis

Congenital heart disease and endocarditis.

Referral

Refer to the specialist (paediatric cardiologist if possible) to confirm the diagnosis and guide management. Children with signs of heart failure need urgent referral to hospital.

Treatment

Education, support and long-term management of young people with rheumatic heart disease is an important role of primary health care.

- Children and adolescents who have had an episode of acute rheumatic fever or have been diagnosed with rheumatic heart disease should begin secondary antibiotic prophylaxis to reduce the risk of future acute rheumatic fever episodes and disease progression (p. 586).
- Ensure medication compliance and adequate follow-up according to the specialist's treatment plan.
- Be aware of preventive measures to be implemented (p. 584). Counsel the family on healthy lifestyle, dental care (p. 585) and reproductive health care (p. 677).

Children with complications and advanced stages of the disease may require further management to reduce symptoms and improve outcomes:

- Pharmacological treatment (diuretics for heart failure, antiarrhythmics for rhythm abnormalities) initiated by specialist
- Cardiac surgery: if children show signs of heart failure which cannot be medically managed, they will require heart valve replacement with a prosthetic heart valve. Depending on the type, this may require lifelong anticoagulation.

6.9 Palpitations

Palpitations are felt by the patient as noticeable heartbeats. They can be felt and described as being too fast, too strong or irregular.

In children, they usually appear in response to a physiological stimulus such as fever, exercise, anxiety or anaemia, rather than a cardiac cause such as arrhythmia. In rare cases, palpitations are associated with life-threatening conditions (Table 54).

History

- Characteristics of palpitations:
  - Sudden or gradual onset and end of the episode
  - Fast, regular, irregular
- Associated symptoms: fever, sweating, headache, tachycardia, breathing fast, cyanosis, chest pain, syncope, weight loss
- Association with exercise
- Consumption or intake of drugs, tobacco, coffee or medicines including short-acting beta-agonists (e.g. salbutamol)
- History of cardiac disease, diabetes mellitus or other diseases
- Family history of congenital cardiac disease or hereditary diseases associated with structural cardiopathy.

Examination

Take vital signs: oxygen saturation, temperature and blood pressure. Perform a complete physical examination (p. 12) and look for:

- Arrhythmia, tachycardia or bradycardia
- Cyanosis, pallor
- Oedema
- Weak or absent axillary and femoral pulses
- Liver enlargement
- Bulging or protruding eyeballs, swelling of the thyroid (goitre).

Investigations

Depending on history and physical examination findings:

- Electrocardiogram if history or any signs suggestive of cardiac disease or palpitations associated with exercise

- Haemoglobin if suspected anaemia
- Blood glucose if suspected hypoglycaemia
- Thyroid function tests if suspected hyperthyroidism
- Other investigations (e.g. cardiac troponin levels, 24-hour electrocardiogram monitoring) may be performed.

Note: some arrhythmias might not be detected in children who are asymptomatic on presentation, e.g. supraventricular tachycardia (p. 335).

Differential diagnosis

Table 54. Differential diagnosis of palpitations

Diagnosis	In favour
Anaemia (p. 406)	• Pallor, conjunctival pallor • Sometimes heart murmur.
Hyperthyroidism (p. 334)	• Sweating, heat intolerance • Swelling of the thyroid (goitre) • Bulging or protruding eyeballs • Weight loss.
Anxiety (p. 534)	• Breathing fast (hyperventilation) • Sometimes elevated blood pressure.
Medicines, drugs	• History of medicine or drug intake • Consumption of tobacco, coffee.
Hypoglycaemia (p. 602)	• Tachycardia, sweating • Weakness • Tremor • Feeling nervous and hungry.
Myocarditis	• Fever • Myalgia, malaise • Chest pain, respiratory distress • Tachycardia disproportionate to the degree of fever • Signs of cardiogenic shock, arrhythmias, palpitations, heart failure (dyspnoea, liver enlargement).

Diagnosis	In favour
Arrhythmia (p. 335)	• Sometimes history of heart disease or heart surgery • Starts and stops suddenly • Pallor, fast breathing • Heartbeat irregular, too slow or too fast.
Pheochromocytoma	• Tachycardia • Sweating • Headache • Elevated blood pressure.
Poisoning (p. 748)	• History of exposure to poison • Signs and symptoms depend on the poison.

Treatment

- Treat underlying cause (see page references in Table 54).
- Remove drugs or medicines when possible if they are the cause of palpitations.
- Once underlying specific conditions are excluded, reassure the child or adolescent and the family. Ask them to return if they present new symptoms.

Referral

Refer urgently if:

- Suspected myocarditis, pheochromocytoma
- Unstable or with an emergency sign (p. 714)
- Abnormal electrocardiogram with other symptoms (e.g. syncope).

Refer to a specialist if:

- Known congenital heart disease or other heart disease
- Palpitations associated with exercise, syncope or chest pain
- Abnormal electrocardiogram without other symptoms
- Suspected hyperthyroidism.

6.9.1 Arrhythmias

Arrhythmias (bradyarrhythmia when the heart beats too slow and tachyarrhythmia when the heart beats too fast) are usually a consequence of structural heart defects, acute heart disease (e.g. myocarditis) or other underlying cause or disease (e.g. respiratory failure with hypoxia, acidosis, hypotension, poisoning, electrolyte imbalance).

- Address and treat the underlying cause or disease.
- Refer the child to the specialist for further investigations and confirmation of the diagnosis; and follow the specialist's management plan.

Supraventricular tachycardia

Supraventricular tachycardia is the most frequent primary arrhythmia in children.

! Supraventricular tachycardia is a life-threatening condition which can lead to cardiogenic shock.

History and examination

Take vital signs: heart rate, oxygen saturation and blood pressure and check capillary refill.

Perform a complete physical examination (p. 12) and look for:

- History of abrupt onset of tachycardia
- Heart rate > 220 beats/min in infants or >180 beats/min in children
- Sweating, pallor, cyanosis
- Infants: feeding problems, irritability, excessive crying, breathing difficulty, especially when feeding
- Older children: palpitations, chest pain, feeling nervous.
- Signs of heart failure: fast breathing, crackles, liver enlargement
- Level of consciousness (AVPU, p. 714)
- Absent or poor axillary and femoral pulse.

Investigations

Perform an electrocardiogram urgently. Supraventricular tachycardia presents with narrow QRS complex and absent or abnormal P waves on all derivations.

Treatment

If haemodynamically unstable (decreased level of consciousness, prolonged capillary refill, low blood pressure, signs of heart failure):

- Manage airway (p. 720), give oxygen (p. 723) and refer urgently for synchronized electrical cardioversion.

If child is haemodynamically stable during an episode of supraventricular tachycardia:

- Attempt vagal manoeuvres while continuously monitoring the child: apply ice to the forehead for less than a minute, without obstructing breathing and with protection (e.g. a tissue) to avoid skin injury.
- In older children modified Vasalva techniques: ask the child to bear down or blow into an occluded straw. **DO NOT** use carotid massage or orbital pressure.
- If the vagal manoeuvres are not immediately successful, continuously monitor the child and arrange urgent referral for treatment with adenosine. **DO NOT** delay referral to apply vagal manoeuvres.

Referral

Refer urgently for acute management of the episode.

If the child is asymptomatic on presentation or after conversion, refer to a specialist for further investigations and potential treatment to prevent recurrence.

6.10 Syncope

Syncope is a transient and complete loss of consciousness and postural tone. It is characterized by:

- Abrupt onset
- Short duration
- Spontaneous complete recovery.

It is due to transient hypoperfusion of the brain secondary to different causes. Most causes are benign, but syncope can be the manifestation of serious and life-threatening disease (Table 56, p. 339).

History

- Characteristics of syncope:
  - Triggering factor
  - Prodromes
  - Duration of the episode
  - Convulsion during the episode
  - Consumption or intake of medicines
- Associated or triggered by exercise
- Associated palpitations and or chest pain
- Prior episode of seizure
- Known heart disease
- Recurrent episodes
- Family history of sudden infant death syndrome, congenital cardiac disease, hereditary diseases associated with structural cardiopathy.

Examination

Take vital signs: oxygen saturation and blood pressure. Perform a complete physical examination (p. 12) and look for:

- Pallor, cyanosis
- Arrhythmic heartbeat, tachycardia or bradycardia or heart murmur on auscultation
- Neurological signs: altered mental status, reduced conscious state, ataxia, reduced muscle tone and strength, absent reflexes, unstable gait, abnormality on examination of cranial nerves
- Contusions (possible trauma owing to loss of postural tone).

Investigations

Depending on the history and physical examination findings:

- Haemoglobin if suspected anaemia
- Blood glucose if suspected hypoglycaemia
- Electrocardiogram.

Differential diagnosis

Differentiate syncope from other conditions with brief or apparent loss of consciousness (Table 55).

If you have confirmed the diagnosis of syncope, identify the underlying cause (Table 56).

Table 55. Differential diagnosis of brief or apparent loss of consciousness

Diagnosis	In favour
Syncope	• Abrupt onset • Short duration • Spontaneous complete recovery.
Seizure (p. 469)	• Usually no prodrome • Cyanosis, redness • Abnormal movements since the beginning of the episode • No spontaneous complete recovery.
Migraine (p. 467)	• Prodrome • Headache prior and after the loss of consciousness (no complete recovery).
Hypoglycaemia (p. 602)	• Loss of consciousness is usually not complete, of gradual onset and longer duration • Recovery with glucose intake (no spontaneous recovery) • Associated with tachycardia, sweating, weakness, tremor.
Severe anaemia (p. 406)	• Gradual onset with symptoms prior to loss of consciousness including pallor, fatigue, weakness.
Anxiety (p. 534)	• History of anxiety with hyperventilation • Triggered by hyperventilation, emotional stress, anxiety crisis.

Table 56. Causes of syncope

Diagnosis	In favour
Common causes	
Vasovagal syncope (fainting) **(p. 340)**	• Most common cause of syncope in children and adolescents • Frequent in female adolescents • Triggers: pain, anxiety, stress • Prodrome: sweating, nausea, pallor, dizziness, visual changes.
Orthostatic hypotension (p. 340)	• Triggered by postural changes (e.g. getting up) • May be associated with dehydration, anaemia, medication use.
Breath-holding spells (p. 340)	• Typically children 6–24 months • Triggers: pain, anger or fear • Cyanosis or pallor • Breath-holding prior to loss of consciousness.
Life-threatening cardiac causes	
Arrhythmias (p. 335)	• Sometimes history of heart disease or heart surgery • Starts and stops suddenly • Pallor, fast breathing • Palpitations, chest pain • Heartbeat irregular, too slow or too fast.
Structural heart disease	• History of congenital heart disease (p. 159), rheumatic heart disease (p. 330), Kawasaki disease (p. 252).

Treatment

▶ Identify children with any life-threatening condition and treat or refer urgently.

Cardiac causes

▶ Refer to a specialist for further investigations and treatment plan.

Vasovagal syncope

- Treatment is usually not required. If recurrent syncope remains unpredictable or frequent episodes, refer to a specialist to consider specific treatment.
- Avoid, if possible, any medication that lowers blood pressure.
- Reassure the child or adolescent and their family that it is harmless and not a disease of the heart or brain.
- Advise caregivers to lift the child's legs up if a syncope occurs.
- Counsel on how to avoid recurrent episodes:
  - Identify and avoid the triggers such as not drinking enough water, hot and crowded environments, standing up too fast.
  - When you start feeling the first symptoms of nausea, dizziness or visual changes, immediately sit or lie down and cross your legs, adopt a squat position, join your hands and tense your arms.

Orthostatic hypotension

- Reassure the child or adolescent and their family that it is harmless and not a disease of the heart or brain.
- Advise caregivers to lift the child's legs up if syncope occurs.
- Counsel on how to avoid recurrent episodes (see counselling in vasovagal syncope above).

Breath-holding spells

- Reassure the family that it is a benign process and counsel the caregivers on how to act during an episode (Counselling box 30).

Counselling box 30. Breath-holding spells

Breath-holding spells

- Breath-holding spells happen when a child gets angry, scared or upset or when the child faces sudden pain, causing it to hold the breath and pass out. These spells are a reflex, not a choice made by the child or a sign of a behavioural problem.
- Breath-holding spells are alarming for parents but usually not harmful to the child. Children recover quickly and completely with no lasting effects.
- Medication is not required. They usually stop by the time a child is 6 years old.

How to act during the spell:

- Remain calm.
- Lay your child down.
- Check your child's mouth for food or any object that might be a choking hazard: do not put anything else in your child's mouth.
- Remove all objects within reach in case your child is having a seizure.

DO NOT shake or slap your child.

- If your child does not recover or respond 2 minutes after passing out, this may not be a breath-holding spell. Call immediately for medical help.

6.11 High blood pressure

High blood pressure (arterial hypertension) in children and adolescents is an incidental finding. Essential hypertension is most frequently found in adolescents. The younger the child the greater the likelihood of an underlying cause.

- Renal (most common cause): sequelae of pyelonephritis, acute or chronic glomerulonephritis, obstructive uropathy, reflux nephropathy, renovascular disease, haemolytic uraemic syndrome, polycystic kidney disease
- Cardiovascular (such as coarctation of the aorta)
- Endocrine: adrenal (Cushing syndrome), thyroid
- Other: steroid therapy, raised intracranial pressure.

Factors such as obesity, prematurity, low birth weight, heredity, diet or stress increase the risk of developing arterial hypertension.

Diagnosis

Normal blood pressure is defined as systolic and diastolic blood pressure values below the 90th percentile for sex, age and height.

Arterial hypertension is defined as systolic and diastolic blood pressure values ≥ 95th percentile for sex, age and height.

Table 57 is a simplified tool to classify patients as hypertensive or not in clinical practice.

History

- Family history of hypertension or renal disease
- History of prematurity, low birth weight, urinary tract infection, congenital kidney or urological anomalies
- Medication intake (glucocorticoids, oral contraceptives), consumption of caffeinated drinks or recreational drugs in adolescents (cocaine, amphetamine)
- Snoring, sleep apnoea.

Table 57. Blood pressure cut-offs for elevated blood pressure and hypertension[1]

	Systolic blood pressure (mmHg)		Diastolic blood pressure (mmHg)	
	Elevated blood pressure[2] (≥ p90 – < p95)	Hypertension (≥ p95)	Elevated blood pressure[2] (≥ p90 – < p95)	Hypertension (≥p95)
1 year	≥100 – <105	≥ 105	≥50 – <55	≥ 55
2 years	≥100 – <105	≥ 105	≥55 – <60	≥ 60
5 years	≥105 – <110	≥ 110	≥65 – <70	≥ 70
10 years	≥115 – <120	≥ 120	≥75 – <80	≥ 80
15 years	≥125 – <130	≥ 130	≥80 – <85	≥ 85
Adults	≥130 – <140	≥ 140	≥85 – <90	≥ 90

[1] Values are given for boys and girls with a p50 for height.
[2] Previously called pre-hypertension.

Examination

Measure blood pressure (p. 789) in the right arm. In asymptomatic patients, hypertension should be confirmed during 3 different visits.

Perform a complete physical examination (p. 12) and look for:

- Obesity
- Skin: café-au-lait spots, neurofibromas, hirsutism, vasculitis
- Heart murmur, diminished or absent peripheral pulses
- Cushingoid appearance: central obesity, moon face, fat lump between shoulders (buffalo hump), bruising, pink stretch marks
- Renal or adrenal masses on abdominal palpation
- Focal neurological deficits or altered conscious state
- Perform fundoscopy if available to assess for hypertensive retinopathy
- If you suspect coarctation of the aorta, measure the blood pressure in both upper and lower limbs with the child lying down.

! Beware of signs and symptoms of:

- **Hypertensive crisis:** grossly elevated blood pressure which can affect organs, and lead to decreased vision, heart failure (difficulty in breathing, liver enlargement), chest pain and signs and symptoms of encephalopathy (see below)
- **Hypertensive encephalopathy** (rare): grossly elevated blood pressure, severe headache, blurred vision, vomiting, progressing to focal neurological deficits, seizures, altered conscious state and coma.

Investigations

- Urine dipstick test (p. 347)
- Full blood count, urea, creatinine, electrolytes, creatinine, thyroid tests
- Electrocardiogram
- Refer to a specialist if further investigations are required to identify the underlying cause.

Treatment

- **In the event of a hypertensive crisis or encephalopathy, refer urgently** to a hospital where neuroimaging is available. Manage ABCDE (Chart 2, p. 716) and seizures (p. 727), if any. Treatment for hypertensive crisis to lower the blood pressure should ONLY be started in hospital. If referral is likely to be delayed, consider starting antihypertensive treatment (e.g. sublingual nifedipine). Do not start treatment if there is a contraindication, e.g. acute intracranial injury, intracranial mass lesion, uncorrected coarctation of the aorta, sympathetic overactivity.
- Arterial hypertension with no known underlying cause: refer to a specialist for further investigations and management. Treatment will depend on the underlying cause.
- Counsel on lifestyle modifications including diet, exercise, good sleep hygiene, no alcohol, no tobacco (see obesity section, p. 519)
- If underlying causes have been ruled out and if no improvement after 6 months of lifestyle modifications, treat essential hypertension. Start single drug therapy with an angiotensin-converting enzyme (ACE) inhibitor (e.g. enalapril), angiotensin II receptor blocker (e.g. losartan), calcium antagonist (e.g. amlodipine) or beta-blocker (e.g. propranolol). Be aware of potential side-effects for each class of antihypertensives. Start with the minimum dose and increase it progressively every 2

to 4 weeks until blood pressure control is achieved. Add a second antihypertensive of another class only if blood pressure is not controlled after 2 to 4 weeks of the first antihypertensive at full dose.

Follow-up

- After starting drug therapy, reassess blood pressure every 2 to 4 weeks to adjust the dose. If the response is good and the target blood pressure is achieved, gradually increase the time interval for follow-up to every 3 to 6 months.
- Consider gradually discontinuing therapy in children with mild initial hypertension who are well controlled on a single drug and respond to ongoing nonpharmacological treatment, such as weight loss and sodium restriction. Children with secondary hypertension in whom a cause has been identified and corrected may also be able to discontinue medication. After discontinuing drug therapy ensure nonpharmacological treatment and regular blood pressure monitoring are ongoing.
- Monitor children and adolescents treated only with nonpharmacological measures every 3 to 6 months to assess whether these measures are successful or drug therapy has to be started.

6.12 Renal problems

Children and adolescents may present with symptoms of renal disease or it may be an incidental finding during examination, e.g. high blood pressure, blood or protein in the urine.

History

- Urinary symptoms: change in urine colour, smell, volume, frequency, pain on urination, incontinence, post-void dribbling, abdominal or flank pain, haematuria, strength of urine stream.
- Abdominal mass
- Systemic symptoms and signs:
  - Renal failure: fatigue, nausea, vomiting, failure to thrive, anuria
  - Hypertension: headache, seizures
  - Fluid overload: dyspnoea, oedema
  - Fever without localizing sign
- Symptoms of underlying cause of renal problems:
  - Recent infection, fever, bloody diarrhoea
  - Autoimmune disease: eye symptoms, rashes, joint pain, mouth sores, haemoptysis, epistaxis
- History of trauma
- Nephrotoxic medications: antibiotics, antivirals, antifungals, chemotherapy, radiocontrast agents

- Family history: hypertension, renal failure or dialysis, renal cystic disease, haematuria, proteinuria, autoimmune disease.

Examination

Take vital signs including blood pressure and temperature. Perform a comprehensive examination and look for:

- Pallor, fluid overload or volume depletion, failure to thrive
- Signs of pulmonary oedema, pleural effusions
- Signs of congestive heart failure, hypertension
- Abdominal masses, renal angle tenderness, palpable kidney, palpable bladder.

Investigations

Urine dipstick for protein, blood, leukocytes, nitrites and ketones:

- Protein may indicate renal disease and needs further investigation
- Frank blood may be present or microscopic haematuria
- Leukocytes and nitrites suggest urinary tract infection (p. 358)
- Ketones suggest dehydration or metabolic conditions.

Consider:

- Full blood count (anaemia, red cell morphology, platelets), urea, electrolytes, creatinine, calcium (renal function), C3, C4 (associated with glomerulonephritis), serum albumin (nephrotic syndrome)
- Urine microscopy: red blood cells, other cells and casts, leukocytes, culture (infection), creatinine, protein, calcium (renal function)
- Renal ultrasound for renal tract abnormalities or stone
- anti-DNase B and Antistreptolysin O titres (post-streptocooccal glomerulonephritis), if recent sore throat or skin infection
- ANA, anti-dsDNA, if features of autoimmune disease.

Treatment and referral

Treatment depends on the underlying cause.

- ▶ Refer children with symptoms associated with serious renal disease, autoimmune disease, abdominal mass, abnormal investigations or unclear diagnosis.

6.12.1 Proteinuria

Proteinuria in children and adolescents is usually harmless and found incidentally.

- Orthostatic proteinuria: most common type in children, especially in adolescent boys
- Transient (functional) proteinuria: can occur with fever, exercise, stress or exposure to cold environment
- Persistent proteinuria may be a sign of serious renal diseases such as nephrotic syndrome (see below).

History and examination

- History of febrile illness, exercise, stress, exposure to cold
- Exclude nephrotic syndrome (see below).

Investigations

If no history for transient proteinuria, repeat dipstick in first-void urine: no proteinuria confirms orthostatic proteinuria.

Treatment and referral

- Transient proteinuria resolves spontaneously.
- Reassure caregivers and child that episodes of transient and orthostatic proteinuria are harmless and require no treatment.
- Refer children with persistent proteinuria to specialist.

Nephrotic syndrome

Nephrotic syndrome is characterized by heavy proteinuria, hypoalbuminaemia and oedema. In Europe most children with nephrotic syndrome have minimal change disease, which responds well to steroid treatment; they are however at risk of relapses.

History and examination

- Oedema (main presenting symptom):
  - Mild: subtle oedema in periorbital region, scrotum or labia
  - Moderate: peripheral pitting oedema of the limbs and sacrum
  - Severe: gross limb oedema, ascites and pleural effusions
- Other symptoms: weight gain, poor urine output, dizziness or discomfort as a result of the oedema (including abdominal pain).

Investigations

- Urinalysis: heavy proteinuria (dipstick 3–4+ or urine protein/creatinine ratio > 0.2 g/mmol) and hypoalbuminaemia (< 25 g/L) confirms the diagnosis of nephrotic syndrome in a child with oedema
- If haematuria is present, idiopathic nephrotic syndrome is unlikely; consider nephritic syndrome (p. 350).

Referral

Refer children and adolescents with suspicion of nephrotic syndrome for confirmation of diagnosis and initiation of treatment. Follow up according to specialist advice and continue treatment.

6.12.2 Haematuria

Haematuria is the presence or red blood cells in the urine.

Isolated microscopic haematuria is common in children and adolescents and may be related to fever or viral infection, urinary tract infection, intense exercise or trauma, or menstruation in adolescent girls. Most children have no additional symptoms.

History and examination

For full history and examination, see p. 12.

- Fever or viral infection
- Painful urination in urinary tract infection (p. 356)
- Intense exercise or trauma
- Menstruation in adolescent girls
- Red urine with no haematuria: food (e.g. beet roots, blackberries, rhubarb) or medicines (e.g. rifampicin).

Assess for less common causes of haematuria:

- Nephritic syndrome (p. 350) due to poststreptococcal glomerulonephritis (p. 350) or Henoch-Schönlein purpura (p. 400)
- Haemolytic uraemic syndrome (p. 351)
- Medicines: cyclophosphamide, nonsteroidal anti-inflammatory drugs
- Renal tumour presenting as abdominal mass (p. 352)
- Kidney stones (p. 360).

Investigations

Urine dipstick and urine microscopy to confirm haematuria.

Treatment and referral

▶ Manage according to underlying cause.

Follow-up

Follow up children with microscopic haematuria with no proteinuria and no other symptoms after 2–3 weeks:

- Repeat physical examination and urine dipstick (at least 7 days after an infection and 2–3 days after intense exercise, not during menstruation).
- If negative, this was transient microscopic haematuria (most common presentation of microhaematuria). No need for further investigations.
- If positive, follow up in 3–6 months. Refer to the specialist if persistence of microhaematuria in the third control, or as soon as other symptoms develop.

Nephritic syndrome

Nephritic syndrome is a result of kidney inflammation and presents with haematuria, proteinuria, and impaired renal function together with hypertension, fluid overload, and oedema.

Several diseases can cause nephritic syndrome. In children, the most common cause is poststreptococcal glomerulonephritis. Other causes include Henoch-Schönlein purpura (p. 400) and other forms of glomerulonephritis.

Referral

Refer to specialist.

Poststreptococcal glomerulonephritis

History and examination

- All age groups but most common in 5–12 years of age
- 7–21 days after group A β-haemolytic streptococcal infection of throat or skin
- Tea-coloured urine, oedema, hypertension, mild-to-moderate impairment of renal function
- May present with isolated haematuria.

Investigations

- Antistreptolysin O titre initially increased.
- Serum C3 decreased but returns to normal within 6–8 weeks. If C3 does not normalize by 6–8 weeks, refer to specialist.
- Microscopic haematuria generally resolves within 6–12 months after onset of nephritis; may persist for up to 2 years.

Treatment and referral

- Give oral phenoxymethylpenicillin (Penicillin V) 125 mg in < 1 year, 250 mg in 1–5 years, 500 mg in 6–12 years or 1 g in adolescents twice a day for 10 days **or** IM benzathine penicillin (penicillin G) 0.6 million U for children < 30 kg, 1.2 million U for children > 30 kg, single dose, if the streptococcal infection is present at the time of diagnosis.
- Refer to hospital: in the acute phase the child may require fluid and salt restriction, diuretics and antihypertensive medication.

Haemolytic uraemic syndrome

Haemolytic uraemic syndrome (HUS) is most common in children aged 9 months to 4 years old.

Signs and symptoms

Typical HUS (90%):

- Diarrhoea caused by bacteria which produce a Shiga-like toxin
- Petechiae, purpura, ecchymosis
- Abdominal pain followed by bloody diarrhoea
- Fever: low-grade or absent
- Renal failure
- Central nervous system involvement (15–20%): irritability, convulsion.

Atypical HUS (10%): without diarrhoea.

Diagnosis

Triad of microangiopathic haemolytic anaemia, thrombocytopenia, and renal failure.

Referral

Refer urgently to hospital, as 40–50% of cases with typical HUS develop acute renal failure requiring dialysis.

Renal tumour

Wilms' tumour or nephroblastoma is the most common primary renal cancer in children. The peak age is 3–4 years.

History and examination

- Often asymptomatic
- Abdominal mass detected during a routine examination e.g. well-child visit
- When symptomatic: abdominal pain, headache and malaise (due to hypertension), haematuria
- May be associated with congenital conditions.

Referral

Refer urgently to the specialist, preferably to a paediatric oncology department.

6.12.3 Renal failure

Acute kidney injury

Acute kidney injury (previously called acute renal failure) is a clinical syndrome in which sudden deterioration of renal function results in the inability of the kidneys to maintain fluid and electrolyte homeostasis.

Acute kidney injury develops suddenly, lasts a short time, and can be serious with long-lasting consequences or may resolve completely once the underlying cause has been treated.

It is commonly identified by elevated serum creatinine levels.

! Refer all children and adolescents with acute kidney injury urgently to hospital.

Chronic kidney disease

See p. 586.

6.13 Genitourinary symptoms

6.13.1 Dysuria

Dysuria relates to pain or burning sensation during urination, which can be present due to several infectious and noninfectious causes (Table 58).

History

- Urinary symptoms: change in urine colour, smell, volume, frequency, pain on urination, incontinence, post-void dribbling, abdominal or flank pain, haematuria, strength of urine stream.
- Systemic symptoms and signs such as fever without localizing sign.

Examination

Ensure privacy when examining external genitalia with a colleague or assistant present.

Take vital signs including blood pressure and temperature.

Examine abdomen, external genitalia and perianal area. Look for:

- Anatomical variations
- Inflammation of external genital areas
- Genital ulcers
- Vaginal or urethral discharge
- Perianal excoriation
- Signs of sexual abuse (p. 639)
- Abdominal pain or masses (palpable bladder in urinary retention).

Investigations

Urine dipstick:

- Protein may suggest renal disease; needs further investigation
- Frank blood may be present or microscopic haematuria
- Leukocytes and nitrites suggest urinary tract infection (p. 358)
- Ketones suggest dehydration or metabolic conditions.

Consider performing or requesting:

- Urine culture (infection)
- Renal ultrasound for renal tract abnormalities or stones.

Differential diagnosis

Table 58. Differential diagnosis of dysuria

Diagnosis	In favour
Infectious causes	
Urinary tract infection (p. 356)	• Fever • Vomiting, poor feeding, irritability in infants • Lower abdominal pain • Increased frequency of passing urine • Leukocytes and nitrites positive in dipstick test.
Balanitis (p. 376)	• Swelling, tenderness and erythema of the penis • Sometimes genital itching.
Vaginitis, vulvovaginitis (p. 382)	• Vaginal discharge, itchiness, redness, and soreness • In infants, irritability and excessive crying.
Pinworms (p. 298)	• Small, white worms in faeces • Itching around the anus, particularly at night, with difficulty sleeping and restlessness • Bed-wetting.
Genital herpes (p. 688)	• Small painful genital ulcers, sometimes in clusters • Sexually active adolescent.
Less common infectious conditions. If needed refer for further investigations to confirm the suspected diagnosis.	
Urethritis	• Uncommon in children • Sexually active adolescent • Urgency, increased frequency of passing urine • Urethral discharge • May be associated with initial haematuria • May be associated with vulvovaginitis or labial adhesions in girls.
Pelvic inflammatory disease	• Sexually active adolescent girls • Pain and tenderness in the lower abdomen • Vaginal discharge, vaginal bleeding • Pain during or after intercourse • Fever.

Diagnosis	In favour
Noninfectious causes	
Labial adhesions (p. 384)	• Labial adhesion of the inner lips or valvula, on examination.
Urinary or kidney stones (p. 360)	• Abdominal or flank pain, usually intense and colicky • May be associated with urinary tract infection • Microscopic or macroscopic haematuria.
Nappy or diaper dermatitis (p. 145)	• Common in the first 1–2 years of life or in older children with disabilities • Inflammation of the skin area covered by a nappy.
Less common noninfectious conditions. Consider referral for further investigations to confirm the suspected diagnosis.	
Trauma	• History of sexual abuse or masturbation.
Functional	• Constipation • Urgency, increased frequency of passing urine • May present with frequent urinary tract infections.
Urethral strictures	• History of urethral injury or surgery • Reduced urinary flow • Urine spraying while passing urine • May present with frequent urinary tract infections.

Urinary tract infection: cystitis and pyelonephritis

Urinary tract infections are common in children and adolescents. Urinary tract infections are more frequent in boys during young infancy because of posterior urethral valves, while uncomplicated cystitis is more frequently found in adolescent girls.

History

Risk factors include:

- Vesicoureteral reflux
- Neurogenic bladder
- Anatomical variations of the lower urinary tract
- Phimosis
- Sexual activity in adolescent girls.

Symptoms

In infants and young children, urinary tract infection often presents with nonspecific signs:

- Fever for at least 24 hours without obvious cause
- Vomiting or poor feeding
- Irritability, lethargy, failure to thrive, jaundice (neonates).

Older children may present with more specific signs:

- Lower abdominal pain
- Loin or suprapubic tenderness
- Pain on passing urine
- Increased frequency of passing urine
- Incontinence in previously continent child.

Differentiate between uncomplicated **cystitis** with bladder involvement only and **pyelonephritis** with systemic signs such as fever, malaise, nausea and vomiting.

Late detection of pyelonephritis and delay in antibiotic treatment of urinary tract infection can lead to sepsis and eventually to renal scars.

Investigations

Urinary tract infection in young children and infants often presents with nonspecific signs such as fever and no other symptoms. Check the urine in all infants with high fever or fever lasting > 24–48 hours with no focalizing signs or symptoms.

Urine collection and testing

- Collect a clean, fresh midstream urine sample and perform a **dipstick** test. Manage according to findings (Table 59).
- If collecting a clean catch urine sample is not possible in young children: use a urine collection pad or bag.
  - If dipstick is negative, urinary tract infection can be ruled out.
  - If dipstick is positive, refer to hospital to collect urine with a urinary catheter or suprapubic bladder aspiration to repeat dipstick and culture when indicated (Table 59).
- **Urine microscopy** may be performed as a confirmatory test.

Table 59. Dipstick findings in suspected urinary tract infection and required actions

Nitrite	Leukocytes	Action
+	+	Send urine sample for culture if criteria are met (see below) Start antibiotics.
+	–	Send urine sample for culture Start antibiotics.
–	+	Send urine sample for culture Consider starting antibiotics.
–	–	DO NOT send urine for culture DO NOT start antibiotics.

Urine culture

- Send a urine sample for **urine culture** in the following cases:
  - Prior to starting antibiotic treatment if indicated
  - No improvement after 48–72 hours of antibiotic treatment
  - Suspected acute pyelonephritis
  - Serious illness
  - Children < 2–3 years (except if negative dipstick or microscopy)
  - Nitrite or leukocyte esterase positive on dipstick
  - No correlation between symptoms and dipstick findings
  - Recurrent urinary tract infections.
- Result of the culture is positive (significant bacteriuria) if there are:
  - $>10^5$ colony-forming units per millilitre of a single organism in a clean catch sample
  - $>5 \times 10^4$ in a catheterized sample
  - Any number of gram-negative bacteria in sample collected by supra-pubic aspiration.
- **Dipslide urine cultures** are a useful point-of-care tool when urine samples cannot be easily sent to a microbiological lab. They yield preliminary results after 24 hours' inoculation.
  - Positive result (significant bacterial growth detected): send urine sample to a microbiological lab for further analysis
  - Negative result: seek an alternative diagnosis and consider stopping antibiotic for urinary tract infection if started.

Ultrasound of the genitourinary system

Perform ultrasound if atypical urinary tract infection: seriously ill, poor urine flow, abdominal or bladder mass, raised serum creatinine, septicaemia.

Treatment

- Counsel caregivers to provide supportive care at home:
  - — Give paracetamol or ibuprofen if the child has pain or high fever (≥ 39 °C) that causes distress (Counselling box 25, p. 230).
  - — Offer frequent fluids to the child, as this will help to clear the infection and prevent dehydration.
  - — Return if fever persists or there is no improvement after 2–3 days or earlier if the child's condition worsens.

Antibiotic treatment

DO NOT give antibiotics if:

- — Asymptomatic bacteriuria in infants and children.
- — Urinary tract infection ruled out (negative dipstick or microscopy).

- Always collect urine for testing and culture **before** initiating antibiotic treatment in a child with suspected urinary tract infection.
- Treat acute cystitis promptly to prevent possible progression to pyelonephritis.
  - — If symptoms are mild or diagnosis is doubtful: delay treatment until the results of the culture are known.
  - — If symptoms are severe: consider starting empirical antibiotic treatment while awaiting culture findings.
- In uncomplicated cystitis: give oral cefalexin 12.5 mg/kg 4 times a day for 3–5 days or amoxicillin-clavulanate, co-trimoxazole or nitrofurantoin (see dosages in Annex 4).
- In urinary tract infections with fever or clinical pyelonephritis: give an oral third-generation cephalosporin such as cefixime at 8 mg/kg twice a day the first day then once a day for 7–10 days. Alternatively, amoxicillin-clavulanate, a second-generation cephalosporin or ciprofloxacin (in adolescents).

Referral

Refer if:

- Child < 3 months of age
- Sick-looking child
- Vomiting or inability to drink or breastfeed.

Consider referral if:

- Signs of dehydration
- Complicated infection.

Follow-up

Follow up in 2–3 days after initiating treatment:

- Adjust the antibiotic treatment based on urine culture and antibiogram once results are available.
- If not improving: repeat urine testing and perform an ultrasound. Refer to specialist if any ultrasound findings. Consider referral to hospital if the child's condition worsens.
- If child shows good response to treatment: do not repeat urine testing.

If first urinary tract infection in infants < 6 months or recurrent infections, perform an ultrasound of the genitourinary system within 6 weeks of the urinary tract infection and refer to specialist if any abnormal ultrasound findings.

Kidney stones

History and examination

Kidney stones or nephrolithiasis may present as:

- Dysuria, urinary tract infection
- Abdominal or flank pain, usually intense and colicky
- Microscopic or macroscopic haematuria
- Incidental finding in imaging.

Referral

Refer for renal ultrasonography and to the specialist for management.

6.13.2 Urinary incontinence

Daytime bladder control and coordination usually develops at 2–3 years of age and nighttime complete bladder control before 6 years of age. Nighttime continence is a developmental process, with significant age variation. There is a strong genetic tendency to bed-wetting.

Urinary incontinence during sleep in children younger than 5 years is normal and should not be considered a problem.

Parental pressure on their children to be continent can be counterproductive.

Bed-wetting (enuresis)

Enuresis, or bed-wetting, refers to intermittent urinary incontinence during sleep in children ≥ 5 years of age. It is common and affects 15% of children at the age of 5 years and decreases with age. Generally, enuresis causes no lasting problems. Most children who wet the bed have no significant underlying physical or emotional problems.

In some cases, enuresis may be associated with the following conditions:

- Neurodevelopmental problems:
  - Autism spectrum disorder (p. 569)
  - Attention deficit hyperactivity disorder (p. 571)
- Renal or urological conditions:
  - Bladder dysfunction
  - Urinary tract infection (p. 356)
  - Chronic kidney disease
  - Posterior urethral valves
  - Ectopic ureter (girls)
- Other medical conditions:
  - Constipation (p. 315), faecal incontinence
  - Pinworms (p. 298)
  - Sleep problems (p. 546)
  - Spina bifida (p. 575)
  - Seizures (p. 469)
  - Diabetes mellitus (p. 601), diabetes insipidus
  - Primary polydipsia
  - Sickle cell disease (p. 614).

History

- Onset of bed-wetting (if acute, i.e. last few days to weeks, consider systemic illness)
- Previously dry at night without assistance for 6 months (secondary enuresis)
- Daytime symptoms: frequency, urgency, polyuria, dysuria or recurrent urinary tract infections, poor urinary stream or straining
- Bed-wetting pattern and trend: nights per week/month, amount, time of night, roused from sleep
- Restrictions in fluid intake, drinks containing caffeine, polydipsia
- Bowel habits: constipation or soiling
- Sleeping arrangements and routine (own bed and bedroom, snoring, disturbed sleep or sleep apnoea)
- Factors which may exacerbate or prolong nocturnal enuresis: developmental or behavioural problems, diabetes mellitus
- Family history of bed-wetting or renal problems
- Social history: family capacity and motivation to engage in treatment, social difficulties, significant change in the child's environment, familial relationships, grief.

If the child has been previously dry at night without assistance for 6 months, consider possible medical, emotional or physical triggers. The presence of unexplained persistent secondary enuresis despite adequate management should prompt specialist referral.

Examination

Ensure privacy when examining external genitalia with a colleague or assistant present.

Perform a comprehensive physical examination (p. 12) and look for:

- Poor growth, loss of weight
- Hypertension
- Distended bladder, faecal mass, abdominal mass on abdominal palpation

- External genitalia and perianal area: epispadia in boys, perianal excoriation (pinworms), inflammation, signs of sexual abuse (p. 639)
- Spina bifida occulta (p. 575) or tethered cord (asymmetrical gluteal fold)
- Leg weakness.

Investigations

- Urine dipstick to exclude urinary tract infection and diabetes
- Consider renal and bladder ultrasound to evaluate for structural abnormalities
- Refer if further investigations are required depending on the suspected diagnosis based on history and examination.

Treatment

- Treat any underlying condition if present, such as constipation (p. 316), urinary tract infection (p. 359) and diabetes (p. 601).
- Explain normal bladder function and reassure that bed-wetting usually resolves with age and causes no lasting problems.
- Counsel on anti-enuretic measures:
  - — Continue drinking regularly and DO NOT restrict fluid intake.
  - — Go to the toilet regularly throughout the day (e.g. during school breaks) and just before bedtime.
  - — Eliminate caffeinated beverages in the evening.

Behavioural interventions and medication for bed-wetting

For most children, enuresis is only a problem when it interferes with their ability to socialize with friends. If it is infrequent and not distressing to the child or caregivers, treatment might not be indicated.

DO NOT start treatment before 6 years of age, as there is a high rate of spontaneous resolution.

DO NOT give tricyclic medications: they present a high risk of adverse events and are no longer recommended.

Bed-wetting alarm (pad and bell) therapy is the most effective treatment available in children older than 6 years of age. It requires both child and parents to be motivated.

- Children should be "in charge" of their alarm and may need to be woken initially to turn the alarm off themselves. It is critical for the success of alarm therapy that the child is fully awake when going to the toilet.
- Rewards can be useful to reinforce behaviour such as waking or visiting the toilet when the alarm goes off. Advise the caregivers not to punish wet nights.
- Explain that it may take 6 to 8 weeks to see signs of improvement.
- If a child is showing early signs of response after 4 weeks, continue treatment until 2 full weeks of uninterrupted dry nights have been achieved.
- Discontinue treatment if no early signs of response within 4 weeks.

Referral

- Refer to a specialist if there are signs of renal or neurological disease, diabetes, systemic illness, serious mental health concerns or diagnostic uncertainty.
- Refer if behavioural interventions are not available or ongoing enuresis is reported in an adolescent.

Daytime wetting

Daytime wetting may be caused by:

- Overactive bladder with urgency
- Voiding postponement; habitually delayed urination, with overfilling and leakage
- Underactive bladder; infrequent urination and overfilling leading to overflow incontinence
- Bladder-bowel dysfunction (non-neurogenic); inability to relax urethral sphincter or pelvic floor muscles during voiding, resulting in an interrupted urinary flow and prolonged voiding time.

History

- Voiding frequency, incontinence, urgency
- Nocturia, polyuria
- Holding manoeuvres (e.g. standing on tiptoes, crossing of the legs, or squatting with the heel pressed into the perineum)
- Straining, weak stream, intermittency, dysuria, post-void dribbling
- Urinary retention.

Other problems can be present:

- Constipation
- Urinary tract infection
- Nighttime wetting (enuresis)
- Excessive tiredness or loss of weight; consider an underlying chronic illness or renal problems
- Polydipsia.

If there has never been a prior period of daytime dryness or the child has continuous incontinence or dribbling (not intermittent), consider anatomical abnormalities.

Examination and investigations

A physical examination and investigations will assist in identifying underlying conditions and causes of incontinence. See examination and investigations for enuresis, p. 362.

Treatment

- Treat any underlying medical condition such as constipation (p. 316) or urinary tract infection (p. 359).
- Counsel caregivers on behavioural modification, nutrition and fluid intake (Counselling box 31).

Referral

- Refer to a specialist if signs of renal or neurological disease, diabetes, systemic illness, serious mental health concerns or diagnostic uncertainty.
- Refer if behavioural management not effective or older child or adolescent.

Counselling box 31. Daytime wetting

How to support your child in overcoming daytime wetting

- Be patient and support your child when wetting occurs.
- Be positive and reassure your child if upset.
- Teach your child a good posture when sitting on the toilet and help your child to relax and take time while urinating.
- Create a schedule for your child to wee every 2–3 hours during the day, even if they do not feel like urinating.
- Give plenty of fluids to your child during the day. Drinking less to reduce the amount of wee makes things worse, because it leads to slow bladder filling and makes it harder to feel the bladder filling up.
- Avoid giving fizzy drinks, chocolate, tea, and other drinks with caffeine.
- Provide additional clothes for school and other activities.

DO NOT punish your child for actions that they cannot control.

DO NOT use nappies if your child feels embarrassed.

6.13.3 Scrotal pain or swelling

Acute scrotal pain, also called acute scrotum, refers to sudden onset of pain, swelling and tenderness of the scrotum.

Scrotal swelling may be acute or chronic and painful or painless (Table 60, p. 368). Abrupt onset of painful scrotal swelling needs emergency surgical management (for conditions such as testicular torsion, incarcerated inguinal hernia).

! Treat acute scrotal pain as an emergency.

History

- Scrotal pain: sudden or insidious onset, uni-or bilateral, pain intensity
- Testicular or scrotal swelling: onset, varying with positions and time of day
- Associated abdominal pain

- Urinary symptoms: change in urine colour, smell, volume, frequency, pain on urination, incontinence, abdominal or flank pain, haematuria, strength of urine stream, urethral secretions
- Systemic symptoms such as fever
- History of trauma
- Sexual activity.

Examination

Ensure privacy when examining external genitalia with a colleague or assistant present.

- Examine the abdomen, inguinal region and genitalia: testes, epididymis, scrotum, penis
- Inspect child or adolescent in standing position: position of testicles (right testicle normally slightly higher than left), swelling, mass in inguinal region (increases with Valsalva?)
- Gently palpate to evaluate tenderness, swelling, mass
- Perform cremasteric reflex
- Look for transillumination (place a light at the base of the scrotum): light shines through fluid-filled masses such as a hydrocele but not solid masses, e.g. a twisted testicle or tumour.

Investigations

- In acute scrotal pain, emergency evaluation with ultrasound to evaluate for testicular torsion
- Ultrasound with doppler to assess anatomy and perfusion in children with scrotal trauma and when assessing a scrotal mass
- Urine dipstick and culture (p. 357) if suspected epididymo-orchitis
- Culture of urethral discharge and PCR testing for chlamydia and gonorrhoea in sexually active adolescents with epididymo-orchitis.

Differential diagnosis

Table 60. Differential diagnosis of scrotal pain and scrotal swelling

Diagnosis	In favour
Scrotal pain	
Testicular torsion (p. 369)	• Sudden onset of severe pain and acute swelling on one side of the scrotum • Nausea and vomiting • Testicle extremely tender to touch • Affected testicle in high-riding or horizontal position • Cremasteric reflex usually absent.
Torsion of appendix of the testis or epididymis (p. 370)	• Common between 7 and 12 years • Sudden onset of severe pain in one testicle on one side of the scrotum • Testis nontender and in normal position • Tender mass at pole of testis, sometimes dark-blue dot at the top of the scrotum • Cremasteric reflex usually present.
Epididymo-orchitis (p. 370)	• Gradual onset • Fever • Urethral discharge • Red swollen hemiscrotum • Testis tender to touch, improving with elevation.
Scrotal trauma (p. 372)	• History of trauma • Tenderness, swelling, bruises in scrotum.
Scrotal swelling	
Varicocele (p. 372)	• Peripubertal boys • Nonpainful scrotal swelling, left side more common • Nontender mass of varicose veins (“bag of worms”) above testicle on palpation.
Hydrocele (p. 373)	• Usually infants, but also older children and adolescents (secondary to epididymo-orchitis, testicular torsion, torsion of the testicular appendages, trauma, or tumour) • Soft, nontender and fluctuant swelling on scrotal palpation • Bright transillumination.

Diagnosis	In favour
Inguinal hernia (p. 375)	• Usually boys • Intermittent nontender reducible swelling in the groin • Appears or increases in size when crying or • coughing • No transillumination.
Incarcerated hernia (p. 375)	• Nonreducible tender inguinoscrotal mass • Irritability, excessive crying in infants • Sometimes signs of intestinal obstruction (vomiting and abdominal distension).
Testicular tumour (p. 373)	• Painless mass in scrotum (rarely painful) • Usually unilateral • Firm-to-hard scrotal swelling • No transillumination.

Testicular torsion

History

Testicular torsion:

- Severe pain and acute swelling on one side of the scrotum
- Nausea and vomiting

Intermittent testicular torsion:

- Sudden onset of acute scrotal pain and swelling
- Rapid resolution
- Asymptomatic between episodes.

Examination

- Red and swollen on one side of the scrotum
- Testicle extremely tender to touch
- Affected testis in high-riding or horizontal position
- Cremasteric reflex usually absent.

Treatment and referral

- Refer urgently to hospital for paediatric surgical review. Surgical delay of 4–6 hours can lead to significant ischaemic damage and affect long-term testicular function.

Torsion of appendix of the testis or epididymis

History

- More common in boys between 7 and 12 years
- Sudden onset of severe pain similar to testicular torsion.

Examination

- Testicle is nontender and in normal position
- Small tender mass at the superior (or inferior) pole of testis, sometimes with a dark-blue spot (due to gangrene)
- Cremasteric reflex usually present.

Investigations

Doppler ultrasound to exclude testicular torsion.

Treatment and referral

- Refer urgently if testicular torsion cannot be excluded.
- Counsel caregivers (and the child or adolescent depending on age) on supportive care at home:
  - — Give the child paracetamol or ibuprofen for pain relief.
  - — The child should rest in bed with adequate support for the tender scrotum.
  - — Return if child worsens or fails to improve after 48 to 72 hours. The pain should resolve in 5–7 days.

Epididymo-orchitis

Epididymo-orchitis is an inflammation of the epididymis and testicle. It is more common in young children < 2 years and in adolescents > 12 years. It is usually due to infection (viral or bacterial), most commonly from a urinary tract or sexually transmitted infection.

History

- Insidious onset
- Fever
- Dysuria, increased frequency in passing urine
- Urethral discharge

- History of mumps infection. Mumps orchitis occurs 4–6 days after parotitis
- History of recent catheterization or cystoscopy.

Examination

- Red, swollen hemiscrotum
- Tenderness in posterolateral part of testis
- Pyuria may be present
- Tenderness improves when elevating the testis.

Investigations

- Urine dipstick and culture (p. 357)
- Culture of urethral discharge and PCR testing for chlamydia and gonorrhoea in sexually active adolescents.

Treatment

- Give antibiotics (see dosages in Annex 4):
  - In children and not sexually active adolescent with urinary tract infection: give oral cefixime 8 mg/kg twice a day the first day, then once a day for 7–10 days or cefalexin, amoxicillin-clavulanate **or** co-trimoxazole for 7–10 days.
  - In sexually active adolescents with suspicion of *Chlamydia trachomatis* or *Neisseria gonorrhoeae*: give IM ceftriaxone 1 g, single dose and oral doxycycline 2.2 mg/kg twice a day for 7–10 days **or** a single dose of azithromycin.
  - In sexually active adolescents with suspicion of enteric organisms: give an oral fluoroquinolone such as ofloxacin **or** levofloxacin for 10 days.
- Counsel caregivers (and the child or adolescent depending on age) on supportive care at home:
  - Give paracetamol or ibuprofen for pain relief.
  - The child should rest in bed with adequate support for the tender scrotum.
  - Return if the child worsens or fails to improve after 48 to 72 hours.

Referral

Refer to hospital for IV antibiotics if young infant or systemically unwell.

Scrotal trauma

Think of child maltreatment if repeated trauma or questionable mechanism (p. 638).

History

- History of falls or kicks during sports, bicycle or car accident.

Examination

- Penetrating vs blunt trauma
- Swelling, oedema, bruises
- Testicle tenderness on palpation, testicle integrity
- Cremasteric reflex (usually present).

Treatment and referral

- Refer for ultrasound and surgical review unless testicle palpation confirms testicular integrity and nonsignificant tenderness.
- Counsel caregivers (and the child or adolescent depending on age) on supportive care at home:
  - — Give paracetamol or ibuprofen for pain relief.
  - — The child should rest in bed with adequate support for the tender scrotum.
  - — Return if the child worsens or fails to improve after 48 to 72 hours.

Varicocele

A varicocele is an enlargement of the veins surrounding the spermatic cords. It is the most common surgically correctable cause of infertility in men.

History

- Young adolescent boys
- Nonpainful scrotal swelling
- Predominantly left-sided.

Examination

Observe scrotum with the child standing and then lying down.

- Mass of varicose veins (“bag of worms”) above testicle on palpation
- Nontender.

Referral

- Refer urgently if the varicocele persists in the lying position, is right-sided or has acute onset (may be due to inferior vena caval obstruction).
- Refer other cases for surgical or urology review.

Hydrocele

A hydrocele is the presence of a fluid collection around a testicle.

History

- Usually infants
- Reactive hydrocele: history of epididymo-orchitis, testicular torsion, torsion of the testicular appendages, trauma or tumour.

Examination

- Soft, nontender and fluctuant swelling on scrotal palpation, which usually does not extend up into the inguinal canal
- Bright positive transillumination
- Look for underlying cause in reactive hydrocele (see sections above)
- Unresolved hydroceles can become inguinal hernias.

Treatment

Hydrocele resolves by the age of 1–2 years in most cases.

Reactive hydrocele usually resolves with the management of the underlying cause. See corresponding sections.

Referral

- Refer to consider surgical repair in unresolved hydrocele at 1–2 years of age.

Testicular tumour

History

- Painless mass in scrotum
- Painful if rapidly growing or associated with haemorrhage or infarction.

Examination

- Painless on palpation
- Unilateral (leukaemic infiltration may be bilateral)
- Firm-to-hard scrotal swelling
- Negative transillumination (positive transillumination if a cyst).

Referral

- Refer urgently to a specialist (preferably in paediatric oncology).

6.13.4 Absent or undescended testis

Absent or undescended testis (cryptorchidism) can be unilateral or bilateral and is the absence of testis or testes in the scrotum. The testis may be absent or undescended.

Undescended testis: descent of the testes along their normal path from the abdominal cavity into the scrotum can be delayed by a few months without causing any problems. It is more common in preterm babies.

Retractile testes are normally descended in the scrotum but can be pulled up from the scrotum by the cremasteric reflex.

Examination

Palpate from the inguinal canal to the scrotum:

- One or both testes are not in the scrotal sac
- Testes can be felt in the groin above the scrotum.

Treatment and referral

- Refer if both testes cannot be palpated
- Refer if testes are not in the scrotum by the corrected age of 4–6 months. If a testis is undescended, surgical (or hormonal) treatment should be provided before 1 year of age to prevent fertility problems and testicular cancer.

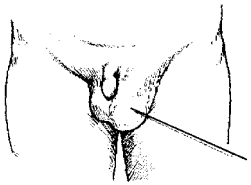
6.13.5 Swelling in the groin

Inguinal hernia

An inguinal hernia is rare in girls. In boys it occurs where the spermatic cord exits the abdomen (inguinal canal).

Examination

- Intermittent, nontender, reducible swelling or mass in the groin, which appears or increases in size when the child is crying, coughing or straining
- No transillumination.



Inguinal hernia

Treatment and referral

- Make sure the hernia is reducible. Most hernias retract spontaneously or by placing the child in Trendelenburg position (see below) with mild pressure applied to the hernia sac:
- If the mass is not reducible, see "incarcerated hernia" for emergency management.
- If the hernia is reducible, ensure a prompt referral for surgical repair to avoid complications.

Incarcerated hernia

This occurs when the bowel or other intra-abdominal structure (e.g. omentum) is trapped in the hernia and the blood circulation to the bowel is compromised.

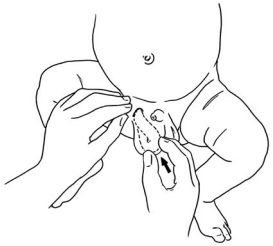
Examination

- Nonreducible inguinoscrotal (rarely umbilical) mass, which is tender, often with skin erythema
- Irritability, excessive crying in infants
- There may be signs of intestinal obstruction (vomiting and abdominal distension) if bowel is trapped in the hernia.

Treatment and referral

- Give the child nothing by mouth (surgery may be required).

- Perform emergency hernia reduction manually (see figure) unless the child is very sick-looking or has signs of intestinal obstruction:
  1. Place child on the back (supine position) with the head low and buttocks elevated on a normal pillow (Trendelenburg position).
  2. Consider giving sedative drugs (e.g. midazolam, see dosages in Annex 4). Crying increases the intra-abdominal pressure, making the hernia reduction more difficult.
  3. Gently squeeze gas and stool from the incarcerated bowel upwards towards the inguinal canal to reduce its size.
  4. Then, apply constant pressure for up to 5 minutes (distal to proximal) to reduce the hernia: the distal hand (right in the figure) should apply slightly greater pressure than the proximal hand (left in the figure) until all the hernial contents return into the abdomen cavity.



Bimanual reduction of an incarcerated inguinal hernia

- If manual reduction is not indicated or unsuccessful: **refer urgently** for paediatric surgical review
- If manual reduction is successful: refer for timely surgical repair. Refer for parenteral antibiotics if suspected compromised bowel function.

6.13.6 Complaints related to the penis and foreskin

Balanitis

Minor redness and soreness of the tip of the foreskin is common in infants and young children and can be managed with reassurance and by avoiding chemical or physical triggers. A more extensive inflammation of the glans penis or foreskin is called balanitis.

Causes of balanitis include:

- Chemical irritation due to poor hygiene: urine trapping, soiled nappies, soap residue
- Physical trauma: forcible foreskin retraction, sexual abuse (p. 639)
- Infection: candida nappy rash in infants, bacterial infection including *Streptococcus pyogenes* (group A streptococcus) infection (rare)

History and examination

- History of urine trapping, soiled nappies, soap residue, forcible foreskin retraction, nappy rash in infants (p. 145)
- Swelling, tenderness and redness of the glans penis or foreskin
- May present with genital itching and dysuria
- Signs of candida infection: isolated spots beyond the border of the main rash and reddened skin with dots or pimples. In severe cases, white, curd-like exudate (cottage cheese-like consistency)
- Signs of *Streptococcus pyogenes* infection: exudate and bright redness, sharply demarcated rash.

Investigations

No investigations are needed.

- Consider swab for rapid streptococcal antigen detection test or culture, only if suspected streptococcal infection.

Treatment

- Counsel on personal hygiene measures for the penis and foreskin (Counselling box 32).
- For irritative balanitis: hydrocortisone 1% cream twice daily for 7 days.
- For nonspecific balanitis: hydrocortisone 1% cream and topical antibiotics (e.g. mupirocin) twice daily for 7 days.
- For balanitis caused by *Streptococcus pyogenes* (confirmed by rapid streptococcal antigen detection test or culture): oral phenoxymethylpenicillin (Penicillin V) 125 mg in < 1 year, 250 mg in 1–5 years, 500 mg in 6–12 years or 1 g in adolescents twice a day for 10 days (see alternative antibiotics as for streptococcal tonsillitis, p. 216).
- Give paracetamol or ibuprofen as required for pain control (p. 508).
- For balanitis with suspected candida infection: topical antifungal agent (e.g. miconazole, topical nystatin) for 5–7 days.
- Advise to return after 2–3 days, or earlier if the child or adolescent worsens.

Counselling box 32. Personal hygiene for the penis and foreskin during treatment of balanitis

Home treatment of balanitis

- Wash your hands regularly.
- Clean the foreskin during showers.
- Change underwear regularly.
- Avoid irritants, tight pants and other mechanical friction.
- Soak the penis in warm saltwater (make sure the water is not too warm by checking with your hand first) twice a day. This will help to settle the swelling and the discomfort.

Phimosis

Phimosis is the inability to retract the foreskin.

- Physiological phimosis: present at birth in nearly all male newborns. With age, foreskin becomes retractable.
- Pathological phimosis results from scarring of the preputial ring preventing retraction.

History and examination

DO NOT attempt to retract the foreskin when there are no complaints or signs of infection.

- History of forceful retraction of the foreskin before it became naturally retractable
- History of episodes of urinary tract infection or balanitis
- Ring of scar tissue visible at foreskin opening
- Foreskin not retractable at the end of puberty
- Previously retractable foreskin becomes nonretractable
- Persistent ballooning of foreskin on urination in older children, with pinhole foreskin opening, narrow urinary stream, not improving with topical steroids.

Treatment

- Reassure caregivers about physiological phimosis, most will resolve spontaneously with age.
- Counsel on personal hygiene measures for the penis and foreskin: clean foreskin during showers and change underwear regularly.

Topical treatment

- Consider topical treatment in children with phimosis and recurrent episodes of balanitis, paraphimosis and urinary tract infections: topical 0.05% betamethasone cream 2–3 times daily for 2–4 weeks. If good response, continue for total of 6–12 weeks.

DO NOT start topical treatment before the age of 3 years if asymptomatic, as most cases resolve by 3–5 years of age.

- There is no age from which treating asymptomatic physiological phimosis is indicated. Consider treating by puberty to enable normal development of sexuality and to prevent paraphimosis in sexually active adolescents.

Referral

- Urgent surgical referral if the child or adolescent is unable to pass urine.
- Refer to surgical or urology services if no or poor response to steroids, and for pathological phimosis.

Paraphimosis

Paraphimosis is a urological emergency and carries a risk of necrosis of the glans penis.

Signs and symptoms

- Foreskin is left in the retracted position
- Foreskin cannot be pushed back over the glans
- Foreskin beyond the tight area becomes occluded and oedematous, making it more difficult to reduce it over the glans.

Differential diagnosis

Hair tourniquet (see below).

Treatment

- Perform manual reduction (unless glans penis necrosis) as soon as possible:
  - — Explain the procedure to the child or adolescent and the caregivers.
  - — Give oral and topical analgesia (e.g. lidocaine 2% gel).
  - — Apply cold packs or compression bandage (2.5 cm) over the oedematous area for 15–30 minutes to reduce the swelling.
  - — Attempt to reduce the foreskin over the glans.
- After successful manual reduction, counsel how to avoid recurrence:

  DO NOT retract the foreskin for a few days.
  - — Only the child should retract the foreskin for cleaning.
  - — After cleaning, make sure that the glans is immediately and completely covered again with the foreskin.

Referral

- Refer urgently to surgical or urology services if unsuccessful manual reduction or if glans penis necrosis (dusky or dark tissue).

Follow-up

Circumcision is not indicated after a single episode and follow-up is not necessary.

Hair tourniquet

In infants, hair or clothing fibres can wind around the penile shaft forming a tourniquet.

Examination

- Redness and swelling of the distal part of the penis with a demarcation line.

Treatment

- Divide fibre or hair ring and check skin for integrity.
- Refer if any concerns.

Zipper injury

The tip of the foreskin or other skin (e.g. scrotum) may become entrapped in the teeth of a zipper.

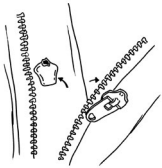
Treatment

▶ Perform the zipper entrapment release technique:

- Give oral analgesia with paracetamol or ibuprofen (p. 508). If you anticipate considerable pain for the child, consider referral to hospital for zipper entrapment release under sedation.
- Always check for injury to the glans and refer for surgical or urology review if present.

Zipper entrapment release technique

1. Cut median bar of zip slider and cut across zipper with wire cutters



2. Separate zip teeth.

Priapism

Priapism is uncommon in childhood and is characterized by prolonged penile erection lasting longer than 4 hours or unrelated to sexual stimulation. Common causes of priapism in children are sickle cell disease, leukaemia and trauma.

Priapism is a **urological emergency** since it can result in ischaemia.

Treatment

▶ Give oral paracetamol or ibuprofen (p. 508) for pain relief.

Referral

Refer urgently:

- For surgical or urology management if erection persists > 4 hours.
- If child cannot pass urine.

6.13.7 Gynaecological complaints

Ask all adolescent girls about sexual activity without the caregiver present. Approach the question sensitively. Girls may not acknowledge being sexually active in front of a caregiver.

Watch out for **RED FLAGS** of sexual abuse (p. 639) in girls who are not sexually active:

- Unusual or excessive itching, bruising, lacerations, redness, swelling or bleeding in the genital or anal area
- Urinary tract infection, blood in urine or faeces, painful urination
- Pregnancy or sexually transmitted infections.

For gynaecological complaints specific to the adolescent, see Chapter 8.

Vaginal discharge (vulvovaginitis)

Vulvovaginitis, an inflammation of the vulva and vagina, is the most common gynaecological problem in prepubescent girls.

Most cases are nonspecific, with several associated risk factors:

- Moisture from synthetic underwear, tight or wet clothing, poor hygiene, obesity
- Irritants: soap, bubble baths, antiseptics
- Prolonged antibiotic treatment
- Infections: candida, *Gardnerella vaginalis*, *Trichomonas vaginalis*, herpes genitalis and other sexually transmitted infections (p. 688) in sexually active adolescents, and pinworms
- Foreign body
- Diabetes mellitus (rare cause).

History and examination

- Vaginal discharge, itchiness, redness, soreness, sometimes dysuria and bleeding. In infants, irritability and excessive crying
- Foul-smelling odour (suggestive of *Trichomonas* or *Gardnerella* spp., or presence of a foreign body)
- White thick discharge (suggestive of candida)
- Vulvar and perianal excoriations (suggestive of pinworms).

Note: most newborn girls have some mucoid white vaginal discharge. This is normal and usually disappears by 3 months of age. From 3 months of age until puberty, physiological vaginal discharge is usually minimal, transparent or whitish, odourless, nonadherent and changes consistency and quantity during the menstrual cycle.

Investigations

- Investigations are not required in most cases.
- Request culture of vaginal discharge, urine culture, depending on the suspected underlying cause.
- Rule out diabetes mellitus (p. 601) in vulvovaginitis that is resistant to treatment.

Treatment

▶ Provide treatment according to the underlying cause:

- — Removal of any foreign body.
- — Candidiasis: topical antifungal agent (e.g. miconazole, nystatin) for 5–7 days.
- — Bacterial vaginosis (*Gardnerella vaginalis*): intravaginal metronidazole (gel 0.75%) 5 g once daily for 5 days or intravaginal clindamycin (cream 2%) 5 g at bedtime for 7 days, or alternatively in adolescents metronidazole 500 mg orally twice a day for 7 days.
- — Pinworms (p. 299).
- — Sexually transmitted infections such as gonorrhoea (p. 692), chlamydia (p. 691), trichomoniasis (p. 691), genital herpes (p. 691).

▶ Counsel caregivers (and the child or adolescent depending on age) on general hygiene measures:

- — After toileting, wipe from front to back with proper drying.
- — Use cotton underwear and avoid tight clothing.
- — Warm bathing (no soap), rinse the genital area well and dry it gently.

Referral

Refer if discharge is profuse, bloody or persistent.

Vaginal bleeding

Many infant girls have some vaginal bleeding in the first week of life caused by withdrawal of maternal estrogens. This is a normal variant and requires no investigation or treatment.

Blood-stained discharge in an older girl may indicate:

- Vaginal foreign body
- More severe vulvovaginitis (p. 382)
- Trauma including straddle injury and sexual abuse (p. 639)
- Excoriation associated with pinworms/threadworms (p. 298)
- Onset of first menstruation; consider as premature if age < 8 years
- Haematuria (p. 349)
- Urethral prolapse (visible inflamed "doughnut" of tissue at the urethral meatus).

Treatment and referral

- Treatment depends on the underlying cause: see page references above.
- Refer in the event of vaginal foreign body, trauma or urethral prolapse.

Labial adhesions

Sometimes the medial edges of the labia minor become adherent. This is a normal variant and will resolve spontaneously in late childhood.

Treatment

- If the child is able to void easily, no treatment is needed other than reassurance that it will resolve spontaneously.

DO NOT manually separate adhesions (traumatic, distressing and risk of recurrence) or use estrogen creams (risk of recurrence).

Vulvar ulcers

Consider sexual abuse in girls who are not sexually active (p. 639).

Vulvar ulcers are rare in girls and adolescents, especially when they are not sexually active. Most lesions are exquisitely painful and result in considerable anxiety and emotional distress for both the patient and family. Most are self-limiting.

- Consider sexually transmitted infections in sexually active adolescents (p. 688)

- Other viral and bacterial infections
- Systemic disease: autoimmune and dermatological conditions
- Drug reactions.

Treatment

- Provide reassurance that ulcers in young girls are often not sexually transmitted, and that recurrence rates are low.
- Specific treatment, depending on the underlying cause:
  - Consider aciclovir if primary herpetic infection is likely (p. 691).
  - For sexually transmitted infections, see p. 688.
- Provide pain relief:
  - Apply petrolatum or zinc oxide barrier after soaking.
  - Topical anaesthetics (e.g. lidocaine gel 2%).
  - Oral paracetamol or ibuprofen (p. 508).
- Counsel caregivers (and the child or adolescent depending on age) on general measures:
  - Use cotton underwear and avoid tight clothing.
  - Remove other irritants such as soaps, pads.
  - Warm bathing of the area in salt water (1 teaspoon of salt in 1 litre of water) might help to reduce the pain. Do not use any soap. Rinse the genital area well and dry it gently.
- Refer to gynaecology or paediatrics if ulcers recurrent or systemic or infectious disease suspected.

6.14 Rashes, itch and other skin problems

Skin conditions are frequent in children of all ages. Skin manifestations are typical for the common childhood infections. They are sometimes related to specific bacterial infections such as Group A *Streptococcus* (*S. pyogenes*) or *Staphylococcus aureus* or an inflammation such as atopic dermatitis or eczema. Underlying diseases such as Henoch-Schönlein purpura, inflammatory bowel disease, systematic lupus erythematosus, neurocutaneous conditions (neurofibromatosis, tuberous sclerosis, Sturge-Weber syndrome), drug reactions and malignancy are rarer causes of skin conditions.

Most skin problems are the domain of the primary care provider.

History

- Skin:
  - — Nature, site and duration of problem
  - — Initial appearance and time course of lesion development
  - — Itch, swelling, redness, blistering, pain

  - Red, itchy worm-shaped rash on the skin (p. 298)
  - Aggravating and relieving factors: contact allergens, ingested substances, topical creams, new washing or bathing products
  - Previous and current treatments (effective or not)
  - History of sunburn.
- Associated symptoms:
  - Atopy, i.e. asthma, allergic rhinitis, eczema
  - Joint symptoms
  - Nail changes
  - Loss of smell, loss of taste.
- Other history:
  - Family history of skin conditions
  - Medication (any regular, recent, over-the-counter or topical)
  - Known allergies
  - Impact of skin condition on quality of life
  - Recent travel.

Examination

Perform a complete physical examination. Examine the skin in good light from head to toe including flexor and extensor surfaces, scalp, hair, nails and mouth. Consider size, shape, colour and distribution of rash, and differentiate between:

- **Erythema:** redness of the skin
- **Macules:** non-palpable lesions < 1 cm
- **Patches:** non-palpable lesions > 1 cm
- **Papules:** palpable lesions < 1 cm
- **Vesicles:** papules < 1 cm containing clear fluid
- **Bullae:** large vesicles > 1 cm
- **Pustules:** vesicles containing pus
- **Purpura:** palpable or non-palpable red/purple lesions caused by bleeding into the skin that do not blanch under pressure.
  - **Petechiae:** pinpoint purpuric lesions
  - **Ecchymoses** (bruises): large purpuric lesions.

! **Non-blanching purpuric rash or petechiae** may be a sign of meningococcal or other bacterial septicaemia. Refer immediately to hospital.

Unexplained bruises on the face, neck, back, thigh, buttocks and genitals may be a sign of child maltreatment (p. 638).

Investigations

- Investigations are usually not required. Most diagnoses are made by inspection and history
- Bacteriological or virological swabs or skin scrapings may assist with diagnosis and treatment options
- Platelet count and coagulation if petechial or purpuric lesions
- Biopsy of lesions (generally conducted at referral facilities).

Differential diagnosis

Based on the appearance of the skin rash, consider the differential diagnosis (some skin conditions can present different types of rash simultaneously or over time):

- Maculopapular rash with or without fever (Table 61, p. 389)
- Vesicular or bullous rash (Table 62, p. 397)
- Purpuric or petechial rash (Table 63, p. 399).

Also consider other skin conditions such as warts (p. 402) and lice (p. 402) and skin conditions specific to the newborn (p. 143).

6.14.1 Maculopapular rash with or without fever

Table 61. Differential diagnosis of a maculopapular rash

Diagnosis	In favour
Maculopapular rash without fever	
Atopic dermatitis eczema (p. 392)	• Dry, itchy skin, typically with erythema, scaling and swelling • Usually first appears between age 3 and 6 months • In infants: on face, head and extensor surfaces of the arms and legs • In children: in flexural creases and skin folds, lesions become lichenified (thickening of the skin) • In adolescents: lichenified lesions in flexor surfaces of the arms and legs • (Family) history of hay fever, asthma, allergic rhinitis.
Nappy rash (p. 145)	• Inflammation of the skin in area covered by the nappy • Common in the first 1–2 years of life • Secondary candida infection may develop.
Seborrhoeic dermatitis (p. 144)	• Infants (before age 2 months) and adolescents • Yellowish, greasy or crusty patches on the scalp, face, trunk, limbs and skin folds. • "Cradle cap" in infants (p. 144) • Associated with dandruff, mildly itchy.
Impetigo (p. 393)	• Common in young children • Discrete lesions with pus or yellowish crusts in exposed areas (face, hands) • Vesicles may evolve to bullae (bullous impetigo, p. 397) • May be associated with lymphadenopathy.
Cellulitis (p. 394)	• Localized warm tender swelling and redness of skin • Skin infection extending to subcutaneous tissues • May develop from skin abrasions, lacerations, burns or eczematous skin.
Abscess (p. 394)	• Collection of pus that has built up from an infected hair follicle, foreign body or unknown source • Tender fluctuant mass, redness on superficial skin.

Diagnosis	In favour
Fungal infection (p. 394)	• Red inflamed area in skin folds (intertrigo) • Round-to-oval flat scaly patches, often itchy • Body (tinea corporis) • Scalp with hair loss (tinea capitis) • Acute fungal inflammation on scalp with tender pustular plaques, may be fluctuant (kerion).
Sunburn (p. 395)	• Exposure to UV radiation • Erythema and oedema, with or without vesicles, followed by skin peeling • Pain and itchiness • If severe: fever, headache, irritability (infants).
Urticaria (p. 395)	• Itchy, raised skin lesions surrounded by erythematous base, called "hives" • Lesions come and go and vary in size • Localized or generalized, well defined margins and often confluent.
Allergic contact dermatitis (p. 396)	• Itchy, dry, red skin normally found 48–72 hours after exposure to an allergen (e.g. insect bites, plants, perfumes, drugs) • Swelling and limited tenderness.
Papular acrodermatitis of childhood	• Associated with multiple viral infections (e.g. HBV, EBV) and vaccines • Papulovesicular rash, nonconfluent and symmetrical, on face, buttocks, legs and arms (including palms and soles); trunk relatively spared • Usually not itchy • Generalized lymphadenopathy, sometimes enlarged liver • Self-limiting up to several weeks.
Pityriasis rosea	• Sometimes mild prodrome (common cold) • Herald patch: single, annular, 1–10 cm, raised border with fine scales • Followed by symmetrical maculopapular rash on trunk and proximal limbs • "Christmas tree" pattern on the back • May be itchy or non-itchy • Self-limiting.

Diagnosis	In favour
Heat rash (miliaria rubra) **(p. 145)**	• Following excessive sweating • Isolated red papules in skin folds (neck, groins, armpits), sometimes itchy • Self-limiting.
Psoriasis	• Sharply demarcated, scaly, bright erythematous plaques mostly on the knees, elbows and scalp • In infants, affects the nappy area.
Scabies (p. 396)	• Intense itchiness, especially at night • Small pearly papules and lesions with pus or crusts between the fingers, on wrists, feet, external genitalia, buttocks, shoulders, periumbilical • In young infants, may present as a generalized rash • Small wavy lines where mites burrow into the skin • Other household members infected • Secondary bacterial infection is common.
Molluscum contagiosum (p. 397)	• Small, umbilicated pearly papules in groups • Persists for months before spontaneous resolution • Acute pustular inflammation may occur before resolution, can result in scarring.
Acne vulgaris (p. 703)	• Common in adolescents • Open (blackheads) or closed (whiteheads) comedones • Papules, pustules, cysts, nodules • Mainly on face, neck, chest, back and upper arms.
Maculopapular rash with fever	
Note: for differential diagnosis of rash with fever **see also child with fever and rashes p. 244**. For rash with fever in children coming from abroad see p. 270.	
Erysipelas (p. 397)	• History of wound • Abrupt onset with high fever, malaise • Bright red, firm and swollen plaque with sharp raised borders, which increases in size rapidly • Mainly on legs, in infants: umbilicus and nappy area (perianal strep A infection)

Diagnosis	In favour
Less common but severe conditions. Refer urgently for further investigations to confirm the suspected diagnosis and for management.	
Toxic shock syndrome	• Associated with use of tampons in adolescent girls • Sick-looking, high fever, low blood pressure • Vomiting, diarrhoea, headache, sore throat • Widespread red sunburn-like rash, particularly on palms and soles.

Atopic dermatitis/eczema

- Give topical corticosteroids, 1–2 applications per day for 5–7 days:
  - 1% hydrocortisone for face.
  - Betamethasone valerate 0.02% or mometasone furoate 0.1% for body and limbs.
  - Advise application of topical corticosteroids before moisturizer for a flare-up (erythema and itch).
- Treat suspected *Staphylococcus aureus* superinfection (impetigo, p. 393 or cellulitis, p. 394) or *Herpes simplex* virus infection (herpetic infection, p. 398).
- Counsel the caregivers (and the child or adolescent depending on age) on supportive care at home (Counselling box 33).

Referral

Refer children with persistent or severe eczema to a specialist. Continue therapy according to specialist treatment plan.

Counselling box 33. Home treatment of atopic dermatitis

How to care for your child with atopic dermatitis at home

General care

- Avoid heat and extremely dry environments (clothes, heaters, hot cars, classrooms, hot baths, blankets).
- Keep your child's nails short and smooth to avoid scratching.

Bathing and skin care

- Bathe your child in warm but not hot water, for 5–10 minutes.
- Use neutral soap when needed, and do not use bubble bath or other irritative products.
- Dry your child after bathing, gently pat your child's skin and do not scrub.
- Avoid dryness of the skin.
- Apply moisturizer at least twice daily from head to toe.

Clothes

- Use cotton clothing.
- Avoid prickly material (wool, sandpits, tags).
- Use non-irritative detergent and cleanse the clothes with abundant water.
- Wash new clothes before your child wears them.

Impetigo

Impetigo is a very contagious infectious disease that is caused by *Streptococcus pyogenes* or *Staphylococcus aureus*.

- For uncomplicated or localized impetigo:
  - — Wash off crusts
  - — Give topical mupirocin 2% ointment or fusidic acid 3 times per day for 5 days.
- If extensive, multiple lesions or not responding to topical treatment: give oral cloxacillin 15 mg/kg 4 times a day for 7 days or cephalexin (see dosages in Annex 4).
- Counsel caregivers to provide supportive care at home (Counselling box 34).

Counselling box 34. Home treatment of impetigo

How to care for your child with impetigo at home

- Impetigo is a mild infection that is very contagious. Keep your child away from school for 1–2 days after starting the treatment and cover the sores completely with dressings when returning to school.
- Keep the lesions, blisters and crusts clean and dry.
- Apply topical cream as instructed.
- Wash your hands frequently and ask your child to do so too.
- Keep your child's nails short.
- Have your child use a separate towel from other persons living in the same household.
- Avoid your child touching or scratching the lesions, blisters and crusts to avoid scarring and spreading of the disease.
- Give paracetamol or ibuprofen if the child has high fever (≥ 39 °C) that causes distress (Counselling box 25).
- Return after 2–3 days, or earlier if your child worsens or develops a fever.

Cellulitis

- Mild cases: give oral cloxacillin 15 mg/kg 4 times a day for 7 days or cephalexin (see dosages in Annex 4).
- Refer to hospital: facial or periorbital cellulitis (p. 454), severe or extensive cellulitis, systemically unwell, or not responding to oral treatment.

Skin abscess

- Incision and drainage of abscess (p. 789).
- Refer to hospital children with abscesses for which drainage requires general anaesthesia, or located in the axillary, perianal or facial areas.

Fungal infection

- Tinea corporis, intertrigo: give topical antifungal such as miconazole 2% or terbinafine 1% twice daily for 2–4 weeks until clinical resolution.

- Tinea capitis and onychomycosis need long-term (4–12 weeks) oral treatment with griseofulvin or fluconazole. Refer to a specialist if in doubt to confirm diagnosis.
- If suspected kerion, refer to a specialist to confirm diagnosis and initiate oral medication.
- Refer any fungal infection not responding to treatment or if there are doubts about the diagnosis.

Sunburn

- Counsel caregivers to provide supportive care:
  - Apply cooling moisturizers and cold compresses to the affected areas
  - Make sure the child receives enough fluids to avoid dehydration.
- Counsel on adequate sun protection (p. 104).
- Rule out heatstroke (p. 227) and manage if needed (p. 740).

Urticaria

- Rule out anaphylaxis (p. 198) if urticaria occurs with swelling of the tongue or throat, difficulty in breathing or low blood pressure. Manage anaphylaxis immediately (p. 731).
- Counsel caregivers to provide supportive care for urticaria:
  - Apply cool compresses to affected skin areas.
  - Identify and avoid aggravating factors such as excessive heat or spicy foods.
  - Avoid aspirin and other nonsteroidal anti-inflammatory drugs as they often worsen symptoms.
- Treat urticaria until complete symptom relief. Follow the therapeutic principle “as little as possible, as much as needed”:
  - Give an oral antihistamine such as loratadine for 3–5 days to alleviate intense itching and control the rash (see dosages p. 829).
  - Give a short course of oral prednisolone 1 mg/kg/day only for severe urticaria.

Allergic reactions/contact dermatitis

- Identify the triggering factor, e.g. soaps or nickel in jeans buttons and earrings.
- Advise to avoid future contact with the identified triggering factor.
- Treat dermatitis with moisturizers (lubricating lotion or calamine lotion) and topical steroids (1% hydrocortisone).
- Give an oral antihistamine such as loratadine for 3–5 days (see dosages p. 829) to alleviate intense itching.
- Refer if extensive contact dermatitis.

Scabies

- In children > 2 years of age, give topical 5% permethrin cream, 0.5% malathion in aqueous base, 5–10% sulfur ointment or 10–25% benzyl benzoate emulsion. In infants < 3 months of age, give crotamiton 10% or sulfur ointment overnight for 3 consecutive nights. A second application may be needed 1–2 weeks later.
- In children > 15 kg, an alternative treatment is a single dose of oral ivermectin 200 mg/kg followed by another dose 10 days later.
- Treat family members and contacts at the same time.
- Give oral antihistamines such as loratadine for 3–5 days (see dosages p. 829) to alleviate intense itching.
- If superinfected and with pustules: consider oral cloxacillin 15 mg/kg 4 times a day for 7 days or cephalexin (see dosages in Annex 4).
- Counsel caregivers to provide supportive care at home:
  - Apply the prescribed lotion to the entire body from neck to toes. In infants, apply also to scalp, face and neck. Leave for the recommended time (usually overnight) before washing it off.
  - Keep your child's nails short.
  - Wash all bedding, clothes and towels in hot water and dry on the first day of treatment.
  - Keep clothes that cannot be washed in a sealed plastic bag for at least 3 days.
  - Give your child separate towels from the other persons living in the same household.

Molluscum contagiosum

- Inform the family that the condition usually resolves spontaneously within months.
- Inform that squeezing or scratching the lesions increases the likelihood of scarring and risk of spreading the infection.
- If in sensitive or pressure exposed area, consider incision and expression of content and disinfect.

Erysipelas

Erysipelas is an infection of the upper layers of the skin, usually caused by *Streptococcus pyogenes*.

- Give oral phenoxymethylpenicillin (penicillin V) 125 mg in < 1 year, 250 mg in 1–5 years, 500 mg in 6–12 years or 1 g in adolescents twice a day for 10 days or amoxicillin (see dosages in Annex 4).
- Provide wound care if needed (p. 485).
- Counsel caregivers to provide supportive care at home and to give paracetamol or ibuprofen as required for pain or if the child has high fever (≥ 39 °C) that causes distress (Counselling box 25 p. 230).

6.14.2 Vesicular or bullous rash

Table 62. Differential diagnosis of a vesicular or bullous rash

Diagnosis	In favour
Varicella	• See Table 41 p. 244
Hand, foot and mouth disease	
Insect bite (p. 491)	• Papule or vesicle at the site of the insect bite • Sometimes redness and itchy rash around the bite • Usually in exposed skin area.
Bullous impetigo (p. 393)	• Common in young children • Vesicles evolve to transparent bullae that burst and form crusty patches in exposed areas (face, hands) • Possibly mild fever and lymphadenopathy.

Diagnosis	In favour
Herpetic infection (Herpes simplex virus, varicella zoster virus) **(p. 398)**	• Recurring episodes of small, painful, fluid-filled blisters on the skin, in the mouth (p. 239), on the lips (cold sores), eyes, or genitals (p. 689) • Herpes zoster (rare in children): painful, fluid-filled blisters in a localized area of the skin (dermatome) with tingling or burning sensation and itching.
Scabies (p. 396)	• See Table 61, p. 389.
(Sun)burn (p. 395)	
Less common conditions. Refer urgently for further investigations to confirm the suspected diagnosis and for management.	
Staphylococcal scalded skin syndrome	• Sick-looking, fever, signs of dehydration • Red blistering skin with appearance of a burn • Large fluid-filled blisters in armpits, groin or in the nose or ears • Rash spreads to trunk, arms and legs • Peeling skin over large areas of the body.

Herpetic infection

- Give aciclovir 20 mg/kg 4 times a day within 72 hours of onset of primary herpes for 7 days.
- Counsel caregivers on supportive measures if herpetic gingivostomatitis is present (Counselling box 26, p. 240).
- Refer to hospital children that are systemically unwell or have extensive infection.

Recurrent herpes infections

Reactivation of labial herpes (cold sores) are usually less severe and of shorter duration than the primo-infection. Prodromal symptoms such as pain, burning or tingling may present before the apparition of the blisters.

- Children with mild symptoms do not need antiviral therapy. Counsel caregivers on supportive measures (Counselling box 26, p. 240).
- In children with occasional recurrences presenting with more severe symptoms and those with prodromal symptoms, give aciclovir 20 mg/kg 4 times a day for 7 days, as soon as symptoms start.

- In children with frequent recurrences and severe symptoms, give aciclovir 20 mg/kg twice (maximum 400 mg) a day for 12 months. Reassess at 12 months and consider stopping treatment.

6.14.3 Purpuric or petechial rash

! Children with a non-blanching purpuric rash need **urgent referral** to hospital.

Table 63. Differential diagnosis of a purpuric or petechial rash

Diagnosis	In favour
Meningococcal (or other bacterial) septicaemia (p. 736)	• Non-blanching purpuric rash, petechiae • Fever • Seriously ill-looking (lethargic, pale, reduced interaction) without apparent cause • Signs of shock, e.g. prolonged capillary refill time.
Henoch-Schönlein purpura (p. 400)	• Palpable purpura • Arthritis/arthralgia • Abdominal pain • Haematuria, proteinuria, hypertension.
Infective endocarditis (p. 329)	• Unexplained weight loss • Enlarged spleen • Pallor, heart murmur, underlying heart disease • Petechiae, finger clubbing or splinter haemorrhages in nail beds.
Less common conditions. Refer for further investigations to confirm the suspected diagnosis.	
Acute haemorrhagic oedema of infancy	• Mild variant of Henoch-Schönlein purpura (above) in infants • Purpuric lesions increasing in size, ecchymoses, particularly in face, ears and limbs (legs > arms) • Swelling (oedema) • Fever.

Diagnosis	In favour
Idiopathic thrombocytopenic purpura	• Easy or excessive bruising • Petechiae, usually in legs • Nose bleeding, bleeding from the gums • Blood in urine or stools.
Haemolytic uraemic syndrome (p. 351)	• Petechiae, purpura, ecchymoses • Haematuria • Abdominal pain followed by bloody diarrhoea • Low-grade or no fever.

Henoch-Schönlein purpura

Henoch-Schönlein purpura (also called immunoglobulin A vasculitis) is the most common vasculitis of childhood. It is most common in children 2–8 years of age.

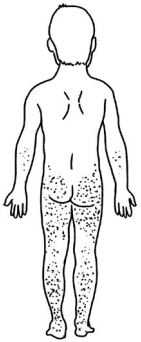
History

History of recent upper respiratory tract infection.

Signs and symptoms

Clinical manifestations can take days to weeks to fully develop and may vary in order of appearance.

- Typical skin rash: palpable purpura, petechiae and bruises, usually symmetrical on buttocks and legs
- Joint pain: usually affects large joints of lower limbs, no significant effusion or warmth
- Abdominal pain.



Henoch-Schönlein purpura

Complications

- Abdominal: signs of bowel obstruction, abdominal tenderness, gastrointestinal haemorrhage, intussusception
- Renal involvement: haematuria, proteinuria and hypertension
- Neurological involvement (rare): changes in mental status, labile mood, apathy, hyperactivity, encephalopathy, focal neurological signs
- Pulmonary involvement (rare): respiratory distress.

Investigations

- Urine dipstick (usually the only investigation required) shows haematuria and proteinuria.
- If hypertension, macroscopic haematuria or significant proteinuria:
  - — Urine microscopy and urinary protein–creatinine ratio
  - — Blood for urea, electrolytes, creatinine and albumin
  - — Full blood count and blood film to exclude other diagnoses, e.g. leukaemia or idiopathic thrombocytopenia purpura.

Treatment

Most cases are self-limiting and can be treated at home with supportive care.

- ▶ Advise bed rest, adequate fluid intake and elevating affected areas if oedema of the legs, buttocks and genital area is present.
- ▶ Give paracetamol or ibuprofen (see dosages in Annex 4) to treat pain. Ibuprofen and other nonsteroidal anti-inflammatory drugs are contraindicated in the event of gastrointestinal bleeding or glomerulonephritis. Severe abdominal pain requires referral to hospital for glucocorticoid treatment.

Referral

Refer if the child is acutely unwell, has nephrotic syndrome (p. 348), acute nephritic syndrome (p. 350), hypertension (p. 342), renal impairment or failure (p. 352), neurological symptoms, severe abdominal pain or gastrointestinal bleeding.

Follow-up

- ▶ Recurrence is possible in 25–35% of patients.
- ▶ Closely follow up to identify significant renal involvement requiring intervention. Such renal involvement can be asymptomatic. If the initial urine dipstick is normal or reveals microscopic haematuria only, review clinically and check blood pressure and early morning urinalysis:
  - — Weekly for the first month after disease onset
  - — Fortnightly from weeks 5–12
  - — Single reviews at 6 and 12 months.
- ▶ Refer to the specialist for further investigations if hypertension, proteinuria or macroscopic haematuria develop at any point.

6.14.4 Warts

Cutaneous warts are caused by infection of the epidermis by human papillomaviruses, which are common in children.

History and examination

- Single lesions or in group, persistent over time
- Common warts: grainy skin growths, rough to the touch, typically on hands, knees or elbows
- Flat warts: flesh-coloured, small, smooth to the touch, commonly on the face and top of the hands or feet
- Usually no associated symptoms, sometimes itchiness and mild pain.

Treatment

- Reassure the caregiver or child that warts usually resolve spontaneously within months or years.
- In case of discomfort or persistent warts, give topical keratolytics (salicylic acid) or irritants (podophyllin).
- Consider specialist referral for curettage, diathermy or excision of persistent warts not responding to topical treatment or concerns about their location (sole of feet).

6.14.5 Lice

Pediculosis capitis is an itchy infestation of the scalp and hair by lice. It is common in schoolchildren.

History and examination

- Close contact with infected other children, combs or hats.
- Itchy scalp, sometimes with visible excoriations
- Small pearly nits (egg capsules) attached firmly to hair shafts; lice are rarely seen.

Treatment

- Remove nits with fine-toothed comb.
- Treat with a topical pediculicide such as permethrin or dimethicone. Malathion 0.5% is an alternative for children ≥ 6 years in areas with resistance to pyrethroids (permethrin and pyrethrins).
- Treat family members and contacts.
- Repeat treatment after 10 days.

6.15 Pallor

Parents often complain that their child is pale, so a diagnostic approach is useful. The colour of the skin is dependent on the quantity of melatonin in the epidermis and on several other factors including anaemia, blood flow to the skin which can be affected by systemic illness, and abnormal deposits in the skin including bilirubin (jaundice) and urea (renal failure). It is therefore important to assess pallor on mucous membranes or conjunctivae which are less affected by these factors.

Most children with pallor do not have a serious condition.

Anaemia is the most common cause of pallor (Table 64).

History

- Onset and duration of pallor
- Fever
- Blood in stool or urine, mucosal bleeding, haematemesis, melaena, haemoptysis or any other recent bleeding
- Bruising, petechiae
- Jaundice
- Lethargy
- Poor growth, low appetite or poor feeding
- Shortness of breath
- Hip or knee pain or claudication
- Diet including ingestion of iron-rich foods and milk intake
- Recent infection
- History of drug ingestion
- Family history of bleeding or bruising, thalassaemia, sickle cell anaemia, glucose-6-phosphate dehydrogenase deficiency.

Examination

Look for:

- Pallor, bruising and petechial spots on skin and mucous membranes
- Pallor and jaundice on conjunctivae
- Liver, spleen and lymph node enlargement
- Flow murmur

- Chest auscultation (crackles suggestive of pneumonia)
- Growth failure.

Investigations

Depending on the suspected underlying cause:

- Full blood count and blood film including reticulocyte count and platelet count (anaemia, malignancy, bone marrow defects), inflammatory markers such as CRP (infections), urea, creatinine (kidney disease), serum bilirubin (haemolysis), iron, ferritin (iron-deficiency anaemia)
- Urinalysis (haemolysis, renal disease).

Differential diagnosis

Table 64. Differential diagnosis of pallor

Diagnosis	In favour
Acute blood loss (p. 735 if haemorrhagic shock)	• Acute onset without fever • History of trauma • Blood in stool or urine, mucosal bleeding, haematemesis, melaena, haemoptysis or any other recent bleeding • Shock.
Haemolytic anaemia (p. 406)	• Sometimes family history of bleeding or bruising, thalassaemia, sickle cell anaemia, glucose-6-phosphate dehydrogenase deficiency • Triggering factors: viral infection, medications • Associated with anaemia • Wine- or tea-coloured urine • Liver, spleen and lymph node enlargement • Jaundice • Flow murmur (anaemia).
Iron-deficiency anaemia (p. 409)	• Tachycardia, heart murmur • Lethargy, fatigue, weakness • Poor growth, poor concentration • Insufficient intake of iron-rich foods: red meat, fish, chicken, green vegetables, legumes • Flow murmur (anaemia).

Diagnosis	In favour
Anaemia of chronic disease (infection, tumour, autoimmune disease)	• Fever • Poor growth • Lethargy • Signs of underlying condition (infection, autoimmune disease, tumour).
Bone marrow defects or suppression (acute leukaemia, other malignancy, aplastic anaemia, infiltrative disorders)	• Poor growth • Lethargy • Liver, spleen and lymph node enlargement • Bruising and petechial spots on skin and mucous membranes • Anaemia with reduced white cells and platelets • Associated with medications (e.g. chloramphenicol, sulphonamides, cytotoxics), viral infection or congenital cause.
Renal failure (p. 352)	• Acute onset in acute kidney injury, insidious in chronic kidney disease • Pallor with or without anaemia • Oedema • Elevated blood pressure • Proteinuria.
Infection	• Acute onset • Fever • Poor growth, poor feeding/eating • Lethargy • Focal signs of pneumonia (p. 184), meningitis (p. 172), pyelonephritis (p. 356) or sepsis (p. 226).
Congestive heart failure (p. 328)	• Acute onset • Pallor with or without anaemia • Shortness of breath • Crackles on chest auscultation • Poor feeding/eating.

Referral

Stabilize and immediately refer children and adolescents with:

- Acute blood loss
- Severe anaemia (Table 65)
- Serious infection (see referral criteria in the corresponding sections of the Pocket Book)
- Congestive heart failure
- Kidney failure
- Signs of haemolytic anaemia, megaloblastic anaemia, thrombocytopenia, bone marrow defects or suppression
- Petechiae, lymphadenopathy, enlarged liver or spleen.

Refer to a specialist children and adolescents with iron-deficiency anaemia not improving with treatment.

Treatment

- Treat the underlying disease or condition.
- In children that have a specific disease or condition, review and follow the specialist's treatment plan.

6.15.1 Anaemia

Anaemia is a condition in which the number of red blood cells is insufficient to meet the body's oxygen needs. Anaemia is the most common cause of pallor.

History

- Pallor
- Fatigue, weakness
- Dizziness
- Shortness of breath
- Poor growth, poor concentration
- Nutrition habits
- History of travel
- Family history of bleeding or bruising, thalassaemia, sickle cell anaemia, glucose-6-phosphate dehydrogenase deficiency.

Examination

- Pallor, pale conjunctivae
- Heart murmur, tachycardia
- Signs of haemolysis: jaundice, scleral icterus, spleen enlargement and dark urine.

Investigations

Stepwise:

- Confirm anaemia by haemoglobin determination, if single rapid diagnostic test is available
- If anaemia is confirmed: full blood count and blood film including reticulocyte count, mean corpuscular volume (MCV) and mean corpuscular haemoglobin concentration (MCHC), iron tests (start with serum iron and ferritin)
- Urine microscopy, serum bilirubin, lactate dehydrogenase and liver function tests to identify or rule out haemolysis.

Diagnosis

Anaemia is defined as haemoglobin less than the lower limit of the reference range for age (Table 65). Living above sea level increases haemoglobin concentrations. For a child living at 2000 m of altitude, the haemoglobin cut-off for defining anaemia should be increased by 10 g/L.

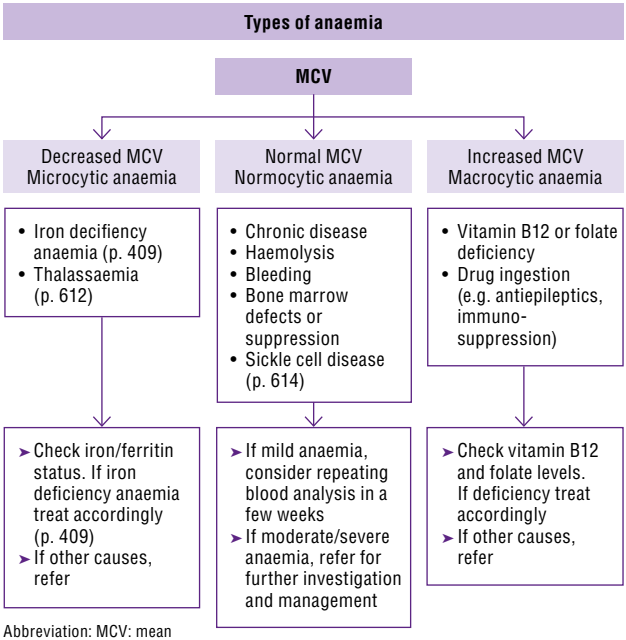
Table 65. Haemoglobin levels (in g/L) for diagnosing anaemia at sea level

Population	No anaemia	Anaemia		
		Mild	Moderate	Severe
Children 6 months–4 years	≥ 110	100–109	70–99	< 70
Children 5–11 years	≥ 115	110–114	80–109	< 80
Children 12–14 years and adolescent girls ≥ 15 years	≥ 120	110–119	80–109	< 80
Adolescent boys ≥ 15 years	≥ 130	110–129	80–109	< 80

Differential diagnosis

Determine if anaemia is microcytic, normocytic or macrocytic based on the mean corpuscular volume (MCV) which can indicate the cause of anaemia. The main causes of and diagnostic approach to anaemia are summarized in Fig. 1.

Fig. 1. Differential diagnosis of anaemia



Abbreviation: MCV: mean corpuscular volume

Iron-deficiency anaemia

Iron deficiency is the commonest cause of anaemia in children and adolescents and is usually due to nutritional iron deficiency. Other causes include conditions leading to malabsorption of iron or blood loss.

History

- Risk factors: prematurity, low birth weight, exclusive breastfeeding after 6 months
- Insufficient red meat, fish, chicken, green vegetables, legumes; excessive cow's milk intake
- History of coeliac disease (p. 296), inflammatory bowel disease (p. 297), giardiasis (p. 295) or worm infections (p. 298)
- Gastrointestinal bleeding e.g. due to chronic use of nonsteroidal anti-inflammatory drugs
- Heavy blood loss during menstruation in adolescent girls (p. 701).

Diagnosis

Iron-deficiency anaemia is based on findings of microcytic anaemia (Fig. 1) with low serum iron and ferritin (cut-off values in Tables 65 and 66).

Table 66. Ferritin cut-off values to define iron deficiency

	Serum ferritin (µg/L)	
	Apparently healthy children	**Children with infection or inflammation**
< 5 years	< 12	< 30
≥ 5 and < 20 years	< 15	< 70

Treatment

- Give iron supplementation (daily iron-folate tablet or dose of iron syrup) at 2–3 mg/kg twice a day for a minimum of 3 months after anaemia has been corrected to replenish stores.
- Counsel caregivers (and the child or adolescent) on dietary intake to optimize iron absorption:
  - — Offer diverse vegetables, fruits and animal-source foods (see counselling on healthy diet, p. 95)

- Eat more red meat, chicken, fish, legumes and green vegetables
- Limit the consumption of cow's milk to 500 mL/day
- Avoid tea and coffee with meals (decreases iron absorption)
- Give your child iron supplements as prescribed with some orange juice or other foods containing vitamin C (improves iron absorption).

Follow-up

- Review in 2 weeks to assess compliance and iron dietary intake.
- After 3 months, repeat full blood count or point-of-care haemoglobin and ferritin.

Referral

Refer children whose iron-deficiency anaemia does not improve with iron supplementation. Iron-refractory iron-deficiency anaemia is a hereditary disorder unresponsive to oral iron supplementation and may be only partially responsive to parenteral iron therapy.

Prevention

Counsel the family on healthy diets containing iron-rich foods (see above).

6.16 Jaundice

Jaundice is caused by an elevated serum bilirubin level. Jaundice is uncommon in children and adolescents beyond the neonatal period (for newborn jaundice see p. 148). Viral hepatitis is the most common cause of jaundice, but other conditions should be considered (Table 67, p. 413). The final diagnosis of most conditions (other than viral hepatitis) will often be made by a specialist.

History

- Duration of jaundice (if > 4–6 weeks may be chronic hepatitis)
- Low appetite, nausea, vomiting
- Fever
- Fatigue
- Headache
- Joint pain
- Symptoms of cholestasis: itchiness, dark urine, pale stools
- Bleeding
- General development
- Recent infection, e.g. acute diarrhoea
- Recent travel
- Contact with poor-quality water, poor sanitation or food hygiene
- Medication and toxin intake including paracetamol, valproate, chlorpromazine, isoniazid, phenytoin, tetracyclines, aspirin
- Immunization status, particularly for hepatitis A and B vaccines
- Potential mode of infection: household contacts with hepatitis B virus infection, blood transfusion, tattoos, sexual activity, use of intravenous drugs
- Family history: liver disease, anaemia, autoimmune disease, hepatitis B infection.

Examination

Look for:

- Weight loss, growth faltering
- Signs of dehydration (p. 276) due to vomiting
- Pallor, jaundice, petechiae or bruises and signs of itching
- Enlarged lymph nodes
- Heart murmur

- Enlarged liver, tender liver, enlarged spleen, tenderness or pain on palpation of right upper quadrant of abdomen
- Neurological symptoms: irritability, decreased level of consciousness, hyperreflexia, confused speech, shaky hands
- Signs of chronic liver disease: finger clubbing, enlarged spleen, ascites, oedema, spider naevi, bruising, nose bleeds, growth failure, gynaecomastia.

RED FLAGS

Signs of acute liver failure

- Fatigue
- Nausea, vomiting
- Abdominal pain
- Weight loss
- Petechial rash, bruising and bleeding due to coagulopathy
- Flapping hand tremor.

Signs of hepatic encephalopathy

- Decreased level of consciousness, drowsiness or lethargy
- Change of personality
- Intellectual and behavioural deterioration
- Speech and motor problems such as confused speech, shaky hands, slow movements.

Investigations

- Blood bilirubin (conjugated and unconjugated):
  - — Increased conjugated bilirubin suggests cholestasis
  - — Increased unconjugated bilirubin suggests increased bilirubin production (e.g. haemolysis), reduced hepatic bilirubin uptake or conjugation (congenital syndromes).
- Full blood count including reticulocytes and blood film, urea, electrolytes, and liver function tests
- Depending on the findings of the above tests, perform or refer for further investigations as required, e.g. clotting studies, Coombs' test, hepatitis serology (particularly serum IgM anti-HAV, HBsAg and anti-HBc), upper abdominal ultrasound (liver, biliary system).

Differential diagnosis

For newborn jaundice see p. 148.

For additional causes of jaundice in children coming from abroad see Table 46, p. 270.

Table 67. Differential diagnosis of jaundice

Diagnosis	In favour
Red blood cell abnormalities: sickle cell disease **(p. 614)**, thalassaemia **(p. 612)**, haemolysis	• Sometimes family history, known haemoglobinopathy (sickle cell disease, thalassaemia) • Triggering factors: viral infection, medications • Pallor, anaemia (sometimes heart murmur), liver enlarged • Wine- or tea-coloured urine • Increased unconjugated bilirubin.
Viral hepatitis (p. 415)	• Low appetite • Abdominal pain • Tender right upper quadrant, enlarged liver • Dark urine • Increased unconjugated and conjugated bilirubin.
Autoimmune hepatitis	• Nausea, vomiting, abdominal pain • Insidious onset • Known underlying autoimmune disease • Increased unconjugated and conjugated bilirubin.
Medications, toxins	• History of medication or toxin exposure • Increased unconjugated or conjugated bilirubin.
Infections (Epstein-Barr virus, cytomegalovirus)	• Tonsillar pharyngitis • Cervical adenopathy • Respiratory symptoms • Malaise, fatigue • Rash • Spleen enlarged • Increased unconjugated and conjugated bilirubin.

Diagnosis	In favour
Metabolic disorders	• Signs and symptoms depending on the underlying disease (α1-antitrypsin deficiency, cystic fibrosis, haemochromatosis, Wilson's disease, hereditary hyperbilirubinaemias), affecting all organs • Increased conjugated bilirubin.
Obstruction (sclerosing cholangitis, veno-occlusive disease)	• Itchiness • Dark urine, pale stools • Increased conjugated bilirubin.
Cholecystitis, cholelithiasis	• Right upper abdominal pain (colic) • Sometimes fever • Increased conjugated bilirubin.
Tumour (hepatic, biliary, pancreatic, peritoneal, duodenal)	• Insidious onset • Weight loss, growth faltering • Abdominal pain, ascites • Increased conjugated bilirubin.
Congenital syndromes (Gilbert syndrome, Crigler-Najjar syndrome)	• Intermittent episodes of jaundice (usually triggered, e.g. by viral infection) • Otherwise asymptomatic in Gilbert syndrome • Increased unconjugated bilirubin.
Congestive heart failure **(p. 328)**	• Acute onset • Pallor with or without anaemia • Shortness of breath • Poor feeding/eating • Heart murmur • Increased unconjugated bilirubin.
Cirrhosis	• Insidious onset, advanced stage of underlying disease • Poor weight gain • Enlarged liver • Gastrointestinal bleeding, ascites.

Referral

Refer urgently to hospital if:

- Signs of liver failure or hepatic encephalopathy
- Severe dehydration
- Severe haemolysis, severe anaemia.

Refer to specialist if:

- No confirmed diagnosis for further investigations and management
- Signs of chronic liver disease
- Prolonged jaundice
- Hepatitis B infection.

Treatment

- Treat the underlying disease or condition. For hepatitis see below.
- Follow the specialist's treatment plan in children with a specific disease or condition.

6.16.1 Viral hepatitis

The clinical features of hepatitis A (HAV) and hepatitis B (HBV) infection are identical. Hepatitis A is a self-limiting disease, but HBV infection can develop into a chronic form. Many children with either infection are asymptomatic.

History

- Prodromal symptoms: lethargy, low appetite, nausea and vomiting, fever, which can be ongoing
- Pain in right upper quadrant of abdomen
- Symptoms of cholestasis: itchiness, dark urine, pale stools
- Duration of jaundice (if > 4–6 weeks may be chronic hepatitis)
- Immunization status (HBV, HAV)
- Contact with poor food or water hygiene, poor sanitation (HAV)
- Potential mode of transmission: household contacts with HBV infection, blood transfusion, tattoos, sexual activity, use of intravenous drugs
- Maternal hepatitis B infection.

Examination

Look for:

- Signs of dehydration (p. 276) due to vomiting
- Jaundice of skin and conjunctiva
- Excoriated skin (from itching)
- Enlarged and tender liver, enlarged spleen
- Signs of acute liver failure or hepatic encephalopathy (p. 412)
- Signs of chronic liver disease: finger clubbing, spleen enlarged, ascites, oedema, spider naevi, bruising, nose bleeds, growth failure, gynaecomastia.

Note: in young children (< 6 years) with HAV infection only one third develop symptomatic hepatitis, lasting < 2 weeks. Older children with HAV infection are often symptomatic for several weeks with jaundice and liver enlargement.

Investigations

- Hepatitis serology, particularly serum IgM anti-HAV and HBV serology (HBsAg and anti-HBc) to confirm the diagnosis
- Full blood examination and blood film, urea, electrolytes, liver function tests and clotting studies
- Ultrasound of the liver.

Treatment

In most cases, no specific therapy is required for acute viral hepatitis.

Hepatitis A can be unpleasant but is not usually serious.

DO NOT prescribe hepatoprotectors.

- ▶ Counsel caregivers (and the child or adolescent depending on age) on supportive care at home:
  - — Give paracetamol or ibuprofen as required for pain control or if the child has high fever (≥ 39 °C) that causes distress (Counselling box 25, p. 230)
  - — Give enough fluids to avoid dehydration
  - — Offer a well-balanced diet to your child depending on appetite
  - — Return after 2–3 days or earlier if your child worsens.

Referral

Refer urgently to hospital if:

- Signs of liver failure or hepatic encephalopathy
- Severe dehydration.

Refer to specialist if:

- Signs of chronic liver disease
- Prolonged jaundice
- Hepatitis B infection (can lead to chronic carrier state, chronic liver disease and carcinoma of the liver).

Follow-up

Follow up all children with acute viral hepatitis to ensure resolution of jaundice.

Prevention

Ensure that immunization against hepatitis B and A are up to date according to local immunization schedules (p. 69).

6.17 Swelling or pain of the joints or bones

Joint swelling is a relatively common presenting complaint in children. It may be an acute problem related to trauma or infection or due to a generalized condition affecting the joint(s) including reactive arthritis. Sometimes joint symptoms may be related to a more chronic problem including juvenile idiopathic arthritis. Intentional (non-accidental) injury should also be considered in the differential diagnosis (Table 68, p. 420).

Most children with bone or joint symptoms – unless the diagnosis is already known – will require referral to a specialist.

History

Joint and bone symptoms:

- Pain characteristics (SOCRATES acronym): Site, Onset, Character, Radiation, Associated symptoms, Time course, Exacerbating/relieving factors and Severity
- Which joints are affected: large joints (knees, hips), small joints
- Duration of symptoms: more than 6 weeks (chronic condition)
- Refusal to bear weight
- Morning stiffness
- Inability to participate in normal activities

Other symptoms:

- Fever
- Purpuric rash on extensor surfaces of legs and buttocks or fine rash
- Lymphadenopathy
- Seizures, delayed development
- Growth faltering or weight loss
- Back pain, abdominal pain

Other history:

- Recent illness with diarrhoea, sore throat or viral symptoms
- History of injury or trauma
- Recent medication/drug use
- Other chronic diseases, e.g. inflammatory bowel disease.

Examination

Examine all joints including the spine and sacroiliac joints and compare both sides. Look for:

- Joint signs:
  - — Tenderness, warmth, swelling, redness of soft tissues, joint effusion
  - — Enlarged costochondral junctions of the thoracic wall and widening of the wrist
- Movement of joints:
  - — Active movement including gait
  - — Passive movement
  - — Localized pain, pain on movement and at rest, limitation in movement
- Bone signs:
  - — Tenderness, swelling, redness, warmth over a bone
  - — Bruising or wounds over a bone
  - — Pain in the injured area that gets worse during movement or when applying pressure
  - — Deformity, dislocation
  - — Limited movement and loss of function in the affected area, e.g. refusal to bear weight in the affected foot, ankle or leg
- Skin: jaundice, rashes, extensive bruising or bruising at unusual sites, petechiae, purpuric rash on extensor surfaces of legs and buttocks or fine rash
- Enlarged liver or spleen, abdominal tenderness, masses or scars
- Lymphadenopathy
- Inguinal or scrotal swelling
- Eye problems: acute anterior uveitis, episcleritis
- Ear, nose and throat: signs of viral illness and tonsillitis
- Signs of child maltreatment (p. 637).

! Septic arthritis is an emergency and must not be mistaken for juvenile idiopathic arthritis. **RED FLAGS** of a septic joint are: swollen, red, often tender and warm to touch. The child may be febrile and cannot bear weight on the joint as it is too painful.

Investigations

Perform the following investigations depending on the suspected cause:

- Full blood count, ESR or CRP
- Blood culture if suspected septic arthritis, osteomyelitis or sepsis
- X-ray of the affected joint(s) if suspected fracture or osteomyelitis
- Ultrasound of the affected joint(s) to check for the presence of synovial fluid, soft tissue and bony changes.

Additional investigations may be needed or be done by a specialist depending on the clinical presentation and suspected diagnosis.

Differential diagnosis

Table 68. Differential diagnosis of swelling or pain of the joints or bones

Diagnosis	In favour
Transient synovitis of the hip (irritable hip)	• Pre-school age (3–8 years) • Hip pain and limp • History of recent viral infection (1–2 weeks) • Usually able to walk but with pain • Otherwise afebrile and well • Mild-to-moderate decrease in range of hip movement, especially internal rotation.
Developmental dysplasia of the hip (p. 141)	• Toddler (1–4 years), more common in girls • Hip pain • Unequal leg length, asymmetrical skin crease at the back of the hip • Loose hip joint • Limited abduction when the hip is flexed (see hip examination in newborns, p. 142).
Toddler's fracture (p. 501)	• Bone fracture of the lower part of the tibia in toddlers (1–4 years) • Often no history of trauma • May present with refusal to bear weight.
Perthes disease (avascular necrosis of the capital femoral epiphysis)	• Age range 2–12 years (peak 4–8 years) • Hip pain and limp • Restricted hip motion.

Diagnosis	In favour
Osgood-Schlatter disease (p. 424)	• Growing adolescents, athletes • Pain and swelling below the knee joint, where the patellar tendon attaches to the top of the shinbone.
Slipped upper femoral epiphysis (p. 424)	• Adolescents > 10 years • Often overweight or obesity • Hip or knee pain and associated limp • Hip appears externally rotated and shortened • Decreased hip movement (especially internal rotation) • May be bilateral.
Overuse syndrome/stress fractures	• Adolescents > 10 years • Chronic pain increasing progressively, more painful on less intense activity • Commonly, weight-bearing bones of the lower leg and foot.
Reactive arthritis (p. 424)	• Recent gastrointestinal or urogenital infection days to weeks before • Usually single joint, most commonly the knees • Sometimes enthesitis (inflammation at ligament insertion sites), swelling at the heels • Sometimes dactylitis, swollen fingers • Can present with extra-articular symptoms including conjunctivitis, dysuria, diarrhoea • Sometimes leukocytosis, usually elevated CRP.
Septic arthritis (p. 424)	• Joint warm, tender, swollen, reddened • Significant pain on movement and at rest • Fever • Refusal to move the affected limb or joint, or to bear weight on the affected leg • Severely reduced range of movement • Leukocytosis and neutrophilia • Recent injury or illness with diarrhoea, sore throat or viral symptoms.

Diagnosis	In favour
Osteomyelitis (p. 424)	• Local tenderness and swelling over the bone • Localized pain and pain on movement • Refusal to move the affected limb or to bear weight on the affected leg • Fever may be present • Often subacute onset.
Trauma, fractures (p. 424)	• History of trauma • Pain at the trauma site • Bruises, wounds.
Intentional injury (p. 638)	• Fractures in unusual sites, multiple fractures, old and healing fractures • Extensive bruising or bruising at unusual sites.
Juvenile idiopathic arthritis (p. 427)	• Arthritis, often episodic, for over 6 weeks • Oligoarthritis (large joints) or polyarthritis (fingers and toes, wrists, hips, knees, jaws) • May develop acute anterior uveitis.
Henoch-Schönlein purpura (p. 400)	• Arthritis or arthralgia • Palpable purpura on extensor surfaces of legs and buttocks • Abdominal pain • Haematuria, proteinuria, hypertension.
Haemophilia	• Acute joint bleeding • Bruising, easy bleeding.
Rickets (p. 425)	• Swollen or widened wrist • Bowing of the legs • Rachitic rosary • Soft or thin skull bones (craniotabes) • Frontal bossing, delayed closure of fontanelles • Convulsions • Failure to thrive, poor growth • Delayed development.
Abdominal conditions	• Conditions such as acute appendicitis (p. 274) and psoas abscess (p. 261) can present with referred pain in hip or back.

Diagnosis	In favour
Inguinoscrotal conditions	• Conditions such as testicular torsion (p. 369) can present with referred hip pain.
Serum sickness (immune-complex-mediated hypersensitivity reaction)	• Joint pain and swelling of several joints • Symptoms 1–2 weeks after exposure to an offending agent, resolve within several weeks of avoidance • History of recent medication/drug use • Fever • Rash.
Infections	• Growth faltering or weight loss and other systemic symptoms, e.g. of tuberculosis (p. 631), brucellosis (p. 262).
Bone tumour	• Swelling of the bone • Chronic bone pain that gets worse over time • Can present with bone fracture.
Bone manifestation of other malignant disease	• Pain and swelling of the bone • Lymphadenopathy • Hepatosplenomegaly • Extensive bruising or bruising at unusual sites • Growth faltering or weight loss, other systemic symptoms • Marked irregularities in blood count • Known malignancy.

Treatment

Most children with joint symptoms, unless the diagnosis is trauma or transient synovitis, require specialist referral for investigation and initiation of treatment.

- Treatment depends on the underlying cause. See page references in Table 68.
- Support the child or adolescent and their family with follow-up treatment and, if required, rehabilitation interventions such as physiotherapy and provision of assistive devices (p. 562).

Trauma

- Treat pain with paracetamol or ibuprofen (p. 598).
- Provide care for wounds or soft tissue injuries (p. 485) or fractures (p. 498) if required.

Osgood-Schlatter disease

- Advise rest and sport limitation depending on severity of the pain.
- If swelling, advise application of cold packs for 15 minutes several times a day.
- Give ibuprofen or paracetamol to alleviate the pain (p. 508).
- Counsel that the pain will completely disappear when the adolescent completes growth.

Transient synovitis

- Advise bed rest.
- Give ibuprofen or paracetamol to alleviate the pain (p. 508).
- Ask the caregivers to return after 3 days or earlier if the child or adolescent is unwell, develops fever or worsens.

Referral

Refer urgently to specialist or hospital if suspected:

- Reactive arthritis
- Osteomyelitis or septic arthritis
- Slipped upper femoral epiphysis
- Perthes disease
- Haemophilia
- Malignancy
- Serum sickness.

Refer to a specialist if:

- Symptoms last more than 4 weeks
- Suspected dysplasia of the hip (p. 141). Although usually diagnosed early in life, condition may have been missed or developed later in childhood.
- Suspected rheumatological condition.

Follow-up

Follow-up depends on the underlying cause. In children with a specific disease or condition review and follow the specialist's treatment plan.

6.17.1 Rickets

Rickets is a disease caused by deficient mineralization of the growth plate and osteoid matrix. It affects growing children. Rickets is mainly caused by insufficient intakes of vitamin D or calcium (nutritional rickets) or by problems associated with the metabolism of vitamin D, calcium or phosphate (poor absorption, increased excretion). The peak incidence occurs at 6–23 months of age, and at 12–15 years of age.

History

- Bone pain in the spine, hip, legs
- Lethargy, unusual irritability
- Weakness
- History of repeated respiratory infections
- Convulsions
- Delayed development
- Risk factors for vitamin D deficiency:
  - No vitamin D supplementation
  - Dark skin colour
  - Low sun exposure
  - Living at higher latitudes in the winter and spring months
  - Prematurity
  - Maternal vitamin D deficiency during pregnancy
  - Prolonged exclusive breastfeeding with low intake of foods containing vitamin D
  - Medication (anticonvulsants, rifampicin, isoniazid or glucocorticoids)
  - Chronic liver or renal disease
  - Disease associated with malabsorption (cystic fibrosis, coeliac disease, inflammatory bowel disease).

Examination

- Bone-related features (depending on child's age):
  - — Swollen or widened wrist in older children
  - — Enlargement of costochondral joints of the ribs (rachitic rosary)
  - — Soft or thin skull bones (craniotabes) in infants
  - — Frontal bossing, delayed closure of the fontanelles
  - — Bowing of the legs (after the child started walking)
  - — Unexplained bone pain
  - — Inability to walk, difficulty climbing stairs, waddling gait, difficulty rising from a chair
- Failure to thrive, poor linear growth
- Delayed motor development such as delayed walking
- Delayed tooth eruption and poor quality of the tooth enamel.

Investigations

To confirm rickets and establish the cause:

- Radiography of the wrists, hands and knees, depending on the disease presentation, to evaluate the epiphyseal plates. Typical features are cupping of the distal bones.
- Blood analysis including serum 25(OH)D level, calcium, phosphate, alkaline phosphatase, parathyroid hormone:
  - — Vitamin D deficiency rickets: low levels of serum 25(OH)D < 30 nmol/L (< 12 ng/mL), increased alkaline phosphatase activity, high parathyroid hormone and low or normal calcium and phosphate.
  - — Other causes of rickets have different combinations of laboratory parameters.

Treatment

- Give vitamin D for the treatment of nutritional rickets (Table 69).
- Ensure daily intake of 30–50 mg of elemental calcium/kg body weight, from diet or supplements.
- Address risk factors whenever possible. Counsel on a healthy diet (p. 95).

Table 69. Vitamin D treatment of nutritional rickets

Age group	Dose of vitamin D in acute phase	Maintenance dose of vitamin D
< 3 months	2000 IU once a day for 3 months	400 IU until the condition is resolved
3 to < 12 months	2000 IU once a day for 3 months or 50 000 IU single dose	
12 months to < 12 years	3000–6000 IU once a day for 3 months or 150 000 IU single dose	600 IU until the condition is resolved
≥ 12 years	6000 once a day for 3 months or 300 000 IU single dose	

Follow-up

Check for compliance with treatment.

Referral

Consider referral depending on the severity of presenting symptoms (e.g. deformities) for further assessment and management.

Refer:

- Other forms of rickets that are not due to vitamin D deficiency
- Children not improving after several weeks' treatment with vitamin D.

Prevention

All infants should receive a daily dose of 400 IU vitamin D for at least the first 12 months of life starting shortly after birth to improve bone health and prevent rickets. Beyond 12 months of age vitamin D supplementation is recommended for children with risk factors for vitamin D deficiency (p. 97 and p. 425).

6.17.2 Juvenile idiopathic arthritis

Juvenile idiopathic arthritis is an umbrella term for a group of autoimmune inflammatory joint diseases of unknown cause leading to non-infectious synovial inflammation. The diagnosis is made when a child less than 16 years of age has arthritis for a period of over six weeks and other causes are excluded.

History

- Bouts of arthritis that are often episodic
- Arthritis after non-specific triggers such as infection or trauma
- Family history of arthritis, inflammatory bowel disease or a chronic skin rash (e.g. psoriasis).

Examination

- Swollen, not tender and warm joint(s)
- Mobility may be reduced and the swollen joints painful and stiff. The degree of discomfort and stiffness varies from simple swelling with no limitation of activity to severe pain and restriction of joint movement. It can be accompanied by systemic symptoms such as tiredness or fluctuating fever.

Different types of juvenile idiopathic arthritis are distinguishable by history and findings on examination (Table 70).

Management

Different forms of juvenile idiopathic arthritis have different prognoses.

Overall, half of all affected children go into spontaneous and permanent remission. Children with chronic, life-altering arthritis need the care and assistance of a multidisciplinary team. Most children will only need treatment for pain and reassurance that the swelling and pain will go away and they will be able to play normally again. A positive approach, reassurance and understanding family, friends and health care providers can alleviate the burden of the disease.

The aim is to control symptoms and enable an active and independent life.

Referral

- Refer to the specialist for confirmation of the diagnosis and development of a treatment plan.
- Refer those with risk of developing anterior uveitis (oligoarthritis, enthesitis-related) for regular eye assessments and specific management by the ophthalmologist. There is a risk of blindness.

Pain management

- Pain can usually be controlled with paracetamol or a nonsteroidal anti-inflammatory drug such as ibuprofen (p. 508).

Table 70. Types of juvenile idiopathic arthritis

Type of juvenile idiopathic arthritis	Signs and symptoms
Oligoarthritis < 5 joints affected; most common form.	• Mainly large joints affected • Often one or both knees • May develop chronic anterior uveitis.
Polyarthritis ≥ 5 joints affected; second most common form.	• Mainly fingers and toes, wrists, hips, knees, jaws • Abrupt or slower onset • Tiredness, low-grade fever • Feeling generally unwell • Rheumatoid factor can be positive or negative
Enthesitis-related arthritis (ankylosing spondylitis)	• Stiffness and pain in spine, legs and sacroiliac joints at site of tendon insertions in bone near joints • Usually adolescent boys, less common in girls • May develop acute anterior uveitis • HLA-B27 positive (80%) • Family history of similar arthritis, "stiff back" or inflammatory bowel disease.
Psoriatic arthritis	• Affects mainly finger and toe joints • Psoriatic rash • Pitting of nails • Family history of rash or joint problems.
Systemic arthritis (Still's disease)	• Intermittent fever > 39 °C but relatively well-looking appearance • Rash on trunk and limbs that fades within 24 hours • Lymphadenopathy, serositis (pericarditis), myocarditis, enlarged liver and spleen • Affects any age (including toddlers).
Undifferentiated arthritis	• Symptoms of 2 or more juvenile idiopathic arthritis types above, or symptoms not matching any type of juvenile idiopathic arthritis.

- Local application of hot and cold pads, massage, hydrotherapy, transcutaneous electrical nerve stimulation and acupuncture have been shown to help reduce pain.
- Steroids (systemic or intra-articular), disease-modifying antirheumatic drugs (DMARDs) such as methotrexate or sulfasalazine, and biologicals such as etanercept or infliximab should only be prescribed by a specialist.

Care coordination

- Cooperate with the multidisciplinary team (including nutritionist and occupational therapist), if needed, for advice on diet and seats, splints or a wheelchair.
- Refer to physiotherapy for help with exercises for stiffness and pain.

Counselling

- Counsel the child or adolescent and their family:
  - Take paracetamol or ibuprofen as required for pain control (p. 508).
  - Ensure a healthy diet (p. 95), regular exercise (p. 103) such as walking and swimming, and good sleep.
  - Maintain a good posture to prevent pain and deformity.
  - Wear a splint (usually at night) if supplied to prevent contractures.
  - Puberty is not affected by juvenile idiopathic arthritis but steroid treatment may delay puberty and lead to a reduction in height. Girls with juvenile idiopathic arthritis may have irregular periods.
  - Flare-ups often follow stress such as an infection or a trauma.

Monitoring

- Monitor for signs of acute anterior uveitis (painful red eyes): this is an emergency that requires urgent referral for treatment with steroids and mydriatic drops to prevent blindness.

6.18 Lumps and swellings

Lumps, in particular neck lumps, are a common presenting complaint in children and adolescents. Most are enlarged lymph nodes (lymphadenopathy). Many healthy children between 2 and 10 years of age present palpable benign lymph nodes, generally caused by viral infections. These "reactive" nodes are typically small, firm and nontender and may persist for weeks to months. Cervical and generalized lymph node enlargement may indicate a more serious disease.

Most lumps are benign and require reassurance.
Refer if suspicion of malignancy, infection or rheumatoid disease.

History

- Duration and sites of lymphadenopathy
- Recurrent or persistent lymphadenopathy
- Associated symptoms of fever, tonsillitis, pain, joint and skin problems, malaise, weight loss and myalgia, itchy scalp
- Contacts with animals particularly cats, history of bites
- Associated chronic disease and HIV infection
- Medication intake
- History of recent travel
- History of atopic or seborrhoeic dermatitis
- Symptoms of hypo- or hyperthyroidism (if swelling in thyroid area).

Examination

Look for:

- Pallor
- Liver or spleen enlarged
- Bone pain on palpation
- Skin: bruising and petechiae, any entry site that could be the cause of a dependent lymphadenopathy, atopic or seborrhoeic dermatitis
- Joints: mobility, redness and swelling
- Weight loss, growth faltering, anorexia (see Growth monitoring p. 119).

Assess lymph nodes, and differentiate between a benign and worrying lymph node (Table 71).

- Size (a lymph node is considered enlarged depending on its location and the child's age):
  - Cervical and axillary: > 10 mm
  - Groin (inguinal): > 15 mm
  - Elbow (epitrochlear): > 5 mm
  - Supraclavicular: any size
  - In newborns (< 1 month of age) > 5 mm for any localization.
- Consistency: soft and fluctuant or hard, firm and rubbery
- Mobile or fixed to adjacent tissues
- Tenderness
- Localized (one region) or generalized (≥ 2 separate regions).

! **RED FLAGS:** cervical, supraclavicular and generalized lymph node enlargement (> 2 cm) which is immobile, hard or firm and not tender.

Table 71. Characteristics of benign versus worrying lymph nodes which need further investigation

	Benign	Worrying, needing investigation
Localization	Inguinal, submandibular	Supraclavicular, epitrochlear, cervical, axillary, generalized
Size	< 2 cm	> 2 cm
Consistency	Soft or fluctuant	Hard, firm and rubbery
Tenderness	Usually tender	Nontender
Mobility	Mobile	Fixed, immobile
Surroundings	Not attached	Attached
Duration and progression	< 2 weeks, slow progression	> 2 weeks, can have progressive growth

	Benign	Worrying, needing investigation
Ultrasound	Small size, oval shape, sharp margins, hilum present, no structural changes, absent Doppler flow, central vascularization.	Large size, rounded shape, absent hilum, irregular margins, structural changes, present Doppler flow, peripheral vascularization.

Differential diagnosis

The main causes of lymphadenopathy are viral and bacterial infections.

Persistent enlargement of lymph nodes (> 2 weeks) may indicate other conditions including systemic infections, malignancy and rheumatological conditions. See Table 72 for main causes of lymphadenopathy.

Differentiate cervical lymphadenopathy from thyroid swelling and other uncommon causes of neck lumps (Table 73, p. 435).

Table 72. Differential diagnosis of lymphadenopathy

Diagnosis	In favour
Infections	
Viral infection	• Bilateral, soft and mobile lymphadenopathies • Recent or current history of fever (p. 224), cough (p. 181), rash (p. 386), ear pain (p. 208).
Infectious mononucleosis (p. 251)	• Cervical adenopathy • Tonsillar pharyngitis • Malaise, severe fatigue • Respiratory symptoms, cough • Spleen enlarged.
Acute bacterial adenitis (p. 437)	• Tender, rapidly growing, fluctuant lymphadenopathy • Warm, erythematous overlying skin, sometimes presenting as an abscess • Following a bacterial infection (*S. aureus*, *S. pyogenes*, rarely anaerobes) • A site of entry may be found, e.g. mouth (tonsils, teeth), scalp.

Diagnosis	In favour
Infections	
Mycobacterial infection (*M. avium* complex, *M. tuberculosis*) **(p. 631)**	• Insidious onset of unilateral, fluctuant, nontender lymphadenopathy, sometimes with spontaneous drainage and sinus formation • Sometimes mild fever, anorexia, growth faltering.
HIV infection (p. 623)	• Nontender lymphadenopathy usually cervical, occipital or axillary • Infants or adolescents with risk behaviour.
Cat scratch disease (*Bartonella henselae*)	• History of close contact with cats, sometimes scratch or bite is not recalled • Tender lymphadenopathy • Fever.
Brucellosis (p. 262)	• History of drinking raw milk or other dairy products • Relapsing or persistent fever • Malaise, musculoskeletal pain, lower backache or hip pain, enlarged spleen, lymphadenopathies, pallor.
Atopic (p. 392) or seborrhoeic dermatitis (p. 144)	• Recurrent lymphadenopathies • Atopic dermatitis: dry, itchy skin, erythema, scaling, or vesicles, history of asthma or allergic rhinitis • Seborrhoeic dermatitis: red and greasy scaly patches on the scalp, between eyebrows, in the nasolabial fold, and on chest.
Lice (p. 402)	• Occipital lymphadenopathies • Itchy scalp
Malignancy	
Lymphoma (Hodgkin's, non-Hodgkin's)	• Nontender lymphadenopathies, firm, attached to underlying tissues • Hodgkin's lymphoma: cervical lymphadenopathy in older children or adolescents • Non-Hodgkin's lymphoma: rapidly progressing and generalized (bilateral) lymphadenopathies • May present with respiratory distress, abdominal pain (mediastinal or abdominal lymphadenopathy).

Diagnosis	In favour
Leukaemia (p. 620)	• Single or generalized lymphadenopathy, non tender, rubbery, fixed • Systemic symptoms such as fatigue, pallor.
Rheumatological conditions	
Juvenile idiopathic arthritis (p. 427)	• Joint pain or swelling affecting one or several joints, for several weeks • Persistent fever • Rash (macular, usually on trunk) • Lymphadenopathy, spleen or liver enlarged.
Systemic lupus erythematosus	• Persistent fever • Weight loss • Pallor, fatigue • Butterfly rash photosensitivity • Joint pain or swelling • Lymphadenopathy.
Medication	• History of medication intake, e.g. allopurinol, isoniazid, phenytoin, carbamazepine • May be associated with rash, jaundice, enlarged liver or spleen, and fever.

Table 73. Other lumps and swellings of the neck

Diagnosis	In favour
Thyroglossal cyst	• Midline cystic lump near the hyoid bone • Lump moves upwards when swallowing or protruding tongue • May become infected and can present as an inflammatory swelling.
Branchial cyst	• Painless, slow-growing, smooth, fluctuant swelling on the side of the neck (anterior to sternocleidomastoid muscle) • May first present as an infected neck lump • Often presents only in adolescence.
Dermoid cyst	• Inclusion cyst under the tongue or on the palate.

Diagnosis	In favour
Lymph angioma (cystic hygroma)	• Soft, fluctuant masses under the skin • Usually in the posterior triangle of the neck (side of the neck, posterior to sternocleidomastoid muscle) • In infants mainly in the oral cavity (tongue or palate).
Haemangioma (p. 147)	• Compressible lump which appears red (superficial) or purple (deep) • Presents in infants.
Thyroid enlargement	• Diffusely enlarged thyroid (goitre) • May present in older children.

Investigations

Acute small cervical lymph nodes with no worrying characteristics in an otherwise healthy child do not require investigation on first presentation.

For generalized lymph nodes, or persistent single lymphadenopathy after 2–3 weeks, consider:

- Full blood count and blood film, ESR, CRP, liver enzymes
- Serology: Epstein-Barr virus, cytomegalovirus, toxoplasmosis, HIV, Bartonella, syphilis, brucella
- Chest X-ray
- Ultrasound of enlarged lymph nodes or swelling and abdomen
- Mantoux or other tests to diagnose tuberculosis.

If underlying cause remains unknown, repeat full blood count and blood film (as above), or refer.

Treatment

Most cases are self-limiting and do NOT require specific treatment.

- Treat underlying conditions including lice (p. 402), eczema (p. 392) and other skin conditions.
- In case of reactive lymph nodes or benign lymphadenopathy (Table 71, p. 432): reassure the family, provide supportive care and follow up, if required, in 2–3 weeks.
- Advise the caregivers to give paracetamol or ibuprofen as required for pain control or if the child has high fever (≥ 39 °C) that causes distress (Counselling box 25, p. 230).

DO NOT give corticosteroids, as they may worsen some infections and hide malignant conditions.

Acute bacterial adenitis

- Assess if drainage of an abscess is required.
- Give oral antibiotics with staphylococcal coverage: cloxacillin 15 mg/kg 4 times a day for 7 days or cefadroxil or cephalexin (see dosages in Annex 4). If you suspect dental disease to be the cause, give amoxicillin-clavulanate 25 mg/kg twice a day. Children with severe cervical lymphadenitis may require referral for IV cloxacillin or cefazoline.
- Ask the caregivers to return if the fever persists after 2–3 days or earlier if the child worsens.

Referral

Refer urgently if:

- Signs of worrying lymphadenopathy (Table 71, p. 432)
- Suspected malignancy, tuberculosis or HIV
- Abscesses that cannot be treated at primary care level for incision and drainage
- Suspected acute bacterial adenitis not improving after 2–3 days of oral antibiotics
- Infants < 3 months with lymphadenopathy.

Refer to a specialist if:

- Neck lumps (Table 73, p. 435)
- Rheumatoid diseases
- Diagnosis remains uncertain or unknown after completing second-level investigations
- You are unsure about the diagnosis.

6.19 Eye problems

Eye problems are common presenting problems in children of all ages. Uncorrected eye and vision problems can worsen over time, therefore early diagnosis and treatment is important to avoid long-term complications and to prevent vision loss.

All children ≥ 3 years of age should undergo age-adapted vision examinations to detect amblyopia, strabismus and refractive errors early. An assessment of vision and visual acuity is recommended for all infants and children during well-child visits (Chapter 3) and when there are:

- Parental concerns about vision
- Any findings during history or examination
- Risk factors for developing visual problems:
  - Preterm birth
  - Neurodevelopmental problems
  - Sensorineural hearing loss
  - Family history of eye diseases or blindness
  - Strabismus, amblyopia, refractive error at an early age
  - Learning difficulties, behavioural problems, reading difficulties, developmental difficulties.

History

- Main complaint: reduced vision, red or itchy eyes, light sensitivity, watery eyes, persistent discharge, reduced eye movement, head tilt, bumps on the eyelids, headaches
- Child sitting close to the television or having trouble with reading
- White appearance of the pupils (possibly noticed in photographs)
- School performance and developmental milestones

- Prenatal and postnatal history, birth weight and gestational age, oxygen therapy if postnatal hospitalization, major trauma, surgery or disease, other medical problems
- Family history: genetic diseases, paediatric glaucoma, cataracts, strabismus, amblyopia (rather than adult-onset eye problems).

Examination

Depending on presenting complaint, assess:

- Eyes and eye lids: chalazion (eyelid cyst), drooping of the upper eyelid (ptosis), red eyes, tearing, malformations
- Particular head posture, e.g. torticollis
- Pupils: unequal pupil size, reactivity direct and indirect (check with a penlight), symmetry of red reflex in the pupils, presence of white pupil (cataracts, retinoblastoma)
- Eye movement in all directions (see image)
- Eye alignment irregularities (e.g. strabismus): perform cover test, cover/uncover test and simultaneous red reflex test (see below)
- Visual acuity (see below)
- Colour vision when appropriate (see below)
- Fundoscopy if needed and possible to inspect optic nerve, macula, vessels and periphery.

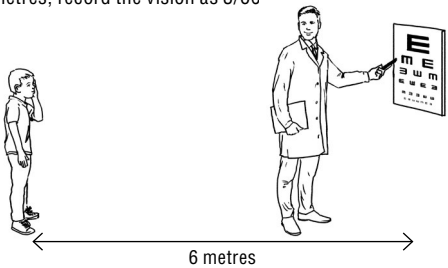
Eye movement: *Ask the child to follow your finger to the six cardinal positions of gaze.*

Visual acuity testing

Assess vision with a visual acuity chart:

1. Place the chart in good light with no glare.
2. Use a visual acuity chart adequate for the age of the child: Lea symbols or HTOV chart in children aged 3–5 years, tumbling E chart or chart with letters in children aged ≥ 6 years.
3. The child should stand 6 metres from the chart.
4. Test each eye separately. Test the right eye first while covering the left eye. Then test the left eye.

5. When using the E chart, ask the child to point his or her fingers in the same direction as the legs of the "E": up, down, right or left.
6. Record the result as a fraction. The first number in the fraction indicates the distance from which the child stands from the chart, usually 6 metres. The second number refers to the distance someone with normal vision could see the same details from.
7. The visual acuity corresponds to the last row for which the child correctly identified more than half of the symbols, letters or "E".
8. If the child cannot read from the top all the way down including the 6/12 line, refer for further testing.
9. If the child cannot even see the big symbol, letter or "E", move the child halfway up to the chart at 3 metres. If the child can see the big symbol, letter or "E" at 3 metres, record the vision as 3/60



Visual acuity testing: *the child should stand 6 metres from the chart, eyes level with the fourth line.*

Refer all children with findings in vision testing that suggest vision problems to an ophthalmologist for further assessment. Refer if you have any concerns in younger children, as vision assessment can be challenging.

Colour vision testing

Test colour vision if there is any concern about colour discrimination, a family history of colour vision problems or any condition or medication associated with colour vision problems. Colour vision testing can be performed when the child is able to name test symbols (numbers). It is not frequently necessary in young children.

1. Use pseudoisochromatic plates (Ishihara or Hardy-Rand-Rittler tests) under good lighting.
2. Ask the child to read the number on each plate, given in random sequence, without touching or tracing the plates.

Stereopsis testing (Lang stereotest)

Test for problems with stereoscopic vision (perception of depth) in children from 2 to 5 years of age:

1. Ask the child if he or she sees something on the card (each card includes three hidden objects) and watch the searching movements of the child's eyes.
2. If one object is spotted, ask the child to look for an additional object, and to describe it.

- ***Normal:*** child identifies all three objects, with eye movements jumping from one object to the next as it is recognized.
- ***Refer to a specialist for further testing:*** child cannot detect the hidden objects and eye movement indicates scanning of the test card without detection of objects.

Cover test to detect strabismus

Ask the child to fixate on a target.

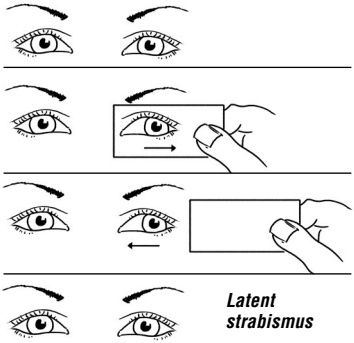
1. Cover one eye and watch for any movement in the other eye
2. Repeat the test on each eye.

- ***Normal:*** no movement in the uncovered eye while covering the opposite eye.
- ***Strabismus:*** movement in the uncovered eye to refixate on the target.

Cover-uncover test to detect latent strabismus

1. Cover one eye for a few seconds.
2. Remove the cover rapidly and look at the previously covered eye for refixation movement:

- ***Normal:*** no refixation movement
- ***Latent strabismus:*** refixation movement.



Simultaneous red reflex test (Brückner test) to detect strabismus

1. Set the ophthalmoscope on zero or close to zero and stand about half a metre away from the child
2. Encourage the child to look at the light and compare the red reflection from each pupil.

- ***Normal:*** pupillary red reflections are equal in size, shape, colour and brightness in both eyes.
- ***Strabismus:*** asymmetry of the red reflections.
- ***Cataract, retinoblastoma:*** absence of red reflex in one eye.

6.19.1 Reduced vision

Uncorrected refractive errors (hyperopia, myopia, astigmatism) are the most common cause of reduced vision in children. They can also lead to strabismus, a misalignment of the visual axes of the eyes.

Early diagnosis and treatment of refractive errors and strabismus is important to enable the child's full development and learning.

If a child complains of poor vision and difficulty with reading, but the vision test is good, counsel on good reading habits:

- Read in good light
- Hold the book about 30 centimetres away
- Rest your eyes for five minutes after each half-hour of reading.

Refractive errors

Refractive errors are common vision problems in children. They occur when the shape of the eye is too long or too short, focusing images in front (myopia, nearsightedness) or behind the retina (hyperopia, farsightedness). Myopia is often first diagnosed in schoolchildren who may be referred by the teacher because they cannot read the blackboard.

History and examination

- Squinting in order to focus
- Tiredness, headaches, reduced concentration
- Difficulty in seeing the blackboard or watching television

- Myopia: near vision clear, far vision unclear on vision testing (p. 439)
- Hyperopia: near vision unclear, far vision clear on vision testing (p. 439).

Treatment and referral

- Refer for vision testing and prescription of glasses with convex (hyperopia) or concave lenses (myopia). The degree of correction is measured in dioptres, with – before the number indicating myopia and + for hyperopia.

Follow-up

- Follow up annually and perform visual acuity testing in all children with refractive errors.

Astigmatism

Refractive error characterized by a variation in the dioptric power of the eye due to an asymmetrical curvature of the cornea or rarely the lens. It is normally combined with other refractive errors.

Symptoms

- As above in refractive errors.

Treatment and referral

- Refer to optician or ophthalmologist for vision testing. The degree of correction with glasses is indicated in addition to the other correction, with the axis of the cylinder (in degrees) indicating the orientation.

Follow-up

- In the beginning, follow up every 3–6 months to check for signs of amblyopia. Then, follow up annually and perform visual acuity testing.

Squint (strabismus)

Misalignment of the visual axes of the eyes due to uncorrected refractive errors or an inherited predisposition.

Symptoms

- Eye misalignment (one eye fixates, the other deviates)
- Diplopia (double vision), may be absent due to suppression

- Reduced visual acuity
- Lack of stereoscopic vision.

Examination

Evaluate ocular alignment:

- Cover test and cover/uncover test (p. 441)
- Simultaneous red reflex test (p. 442).

Treatment and referral

- Refer children ≥ 6 months with suspected strabismus to an ophthalmologist.
- Follow the specialist's treatment plan. Therapy options include:
  - Correction of refractive error
  - Visual training therapy
  - Occlusion therapy (eye-patching)
  - Surgery.

Amblyopia

Reduced vision in one or both eyes often caused by insufficient visual stimulation during critical periods in the development of normal vision in early childhood. Amblyopia generally develops from birth up to age 9 years. It can be the consequence of untreated strabismus.

History and examination

- History of strabismus and refractive errors
- Decreased visual acuity in one or both eyes
- Red light reflex: asymmetry in colour or brightness
- Cover and cover/uncover testing for associated strabismus (p. 441).

Treatment and referral

- Refer to ophthalmologist for further investigation and treatment.
- Follow the ophthalmologists's treatment plan. Therapy options include:
  - Correction of refractive error
  - Occlusion therapy (eye-patching) or atropine treatment
  - Surgery.

6.19.2 Red eyes

Red eyes are a common reason for consultation. A red eye is usually a manifestation of an ocular inflammation including conjunctivitis, keratitis, (epi-)scleritis and uveitis (Table 74). The cause may be an infection, trauma, or rarely a malignancy or autoimmune reaction due to systemic autoimmune disease such as juvenile idiopathic arthritis, Behçet's disease, sarcoidosis or Sjögren's syndrome leading to anterior uveitis.

History

- Duration of symptoms, recurrent episodes
- Unilateral or bilateral
- Itchiness
- Burning, foreign body sensation
- Photophobia
- Eye discharge and characteristics (watery, purulent)
- Normal or reduced vision
- History of chemical exposure, trauma
- Use of contact lenses
- Associated symptoms: fever, cough, runny nose, sneezing, throat pain
- Known medical condition, e.g. inflammatory bowel disease, juvenile idiopathic arthritis.

Examination

Look for:

- Extent and location of redness: diffuse redness (conjunctival injection), a ring-like pattern around the cornea (ciliary injection)
- Unilateral or bilateral
- Eye discharge: watery, purulent
- Swelling of the eyelids or swelling around the eye
- Eyelids: complete closure, swollen
- Cornea: clear or hazy/opacities
- Presence of a foreign body, trauma
- Unequal pupil size, reactivity of pupils (check with a penlight).

Table 74. Differential diagnosis of red eye

Diagnosis	In favour
Acute conjunctivitis (p. 447)	• Diffusely red eye (conjunctival injection) • Watery or purulent eye discharge • Burning sensation, itchiness, but no eye pain • Normal vision • Normal cornea and pupil • Mostly bilateral in viral conjunctivitis.
Keratitis (p. 450)	• Hazy cornea, diffuse or localized opacity • Red around the cornea (ciliary injection) • Limited eye discharge • Eye pain • May present with reduced vision • Normal pupil, constricted (myosis) if associated with uveitis.
Uveitis (p. 451)	• Constricted pupil (myosis), poor response to light • Red around the cornea (ciliary injection) • Eye pain • Reduced vision • Cornea may be hazy • No eye discharge.
(Epi-)scleritis (p. 451)	• Redness of the sclera (around the cornea) • Normal cornea and pupil • Minimal watery discharge • Eye pain.
Foreign body (p. 452)	• Sudden onset of eye pain • Foreign body sensation • Usually unilateral.

Acute conjunctivitis

Conjunctivitis is an inflammation of the conjunctiva which is common in young children. It is usually caused by a viral (adenovirus) or bacterial infections (*S. pneumoniae*, *S. aureus* and *H. influenzae*). In newborns and sexually active adolescents it might be due to *N. gonorrhoea* and *Chlamydia trachomatis*. It may also be noninfectious (allergic, traumatic) in origin.

Bacterial and viral conjunctivitis are highly contagious.

Diagnosis

Distinguish between the different causes of acute conjunctivitis (Table 75) and consider other conditions causing red eyes (Table 74).

Investigations

Cultures and microscopy are not routinely necessary for the initial diagnosis, except if suspected infection with *N. gonorrhoea* or *Chlamydia trachomatis* (profuse purulent discharge in newborn or sexually active adolescent):

- Giemsa stain and culture (*Chlamydia trachomatis*)
- Gram stain: gram-negative intracellular cocci (*N. gonorrhoea*).

Table 75. Differential diagnosis of acute conjunctivitis

Diagnosis	In favour
Viral	• Exposure to an infected person or recent upper respiratory tract symptoms • Often bilateral (usually starts in one eye and spreads to the other within a few days) • Watery discharge • Itching, burning, foreign body sensation • Normal vision • Often with or after symptoms of upper respiratory infection.
Bacterial	• Purulent discharge • Usually unilateral but can be bilateral • Normal vision • Itching is uncommon.

Diagnosis	In favour
Allergic	• History of atopic dermatitis, hay fever and asthma • Intense itching (primary complaint) • Usually bilateral • Lid oedema • Watery or mucoid discharge • Cobblestone papillae under upper lid • Other allergic symptoms: sneezing, wheezing, nasal congestion.
Noninfectious non-inflammatory	• History of chemical exposure, mechanical irritation, wearing contact lenses or medication intake.
Systemic disease	• Acute presentation: measles (p. 246), Kawasaki disease (p. 252), Stevens-Johnson syndrome • Postinfectious: reactive arthritis (p. 421) • Chronic manifestation: inflammatory bowel disease (p. 297), juvenile idiopathic arthritis (p. 427).

Referral

Refer **urgently** to ophthalmologist if:

- Significant pain, light sensitivity (photophobia), irregular/fixed pupil, white spot on cornea, visual loss or bloody conjunctivitis
- History of trauma
- Contact with chemicals.

Refer to ophthalmologist if:

- Symptoms persist > 7 to 10 days after initiating treatment
- Suspected systemic disease
- Suspected *Chlamydia trachomatis* or *N. gonorrhoea* infection (for IV treatment).

Treatment

DO NOT give topical corticoids unless prescribed by the ophthalmologist, because corticoids can prolong and worsen viral conjunctivitis.

DO NOT cover the eye with a patch.

▶ Give specific treatment depending on the underlying cause.

Viral conjunctivitis

Viral conjunctivitis will resolve by itself within few days, with no need for medicines.

- Counsel caregivers on the importance of hygiene measures:
  - — Acute conjunctivitis is highly contagious and can easily spread to others. Make sure you and your child:
    - Avoid touching the child's eyes
    - Wash your hands before and after touching or treating the child's eye
    - Use a clean cloth to wipe the eye if there is discharge
    - DO NOT share tissue and towels with other persons.

Bacterial conjunctivitis

- Give topical antibiotics such as azithromycin (1.5%), gentamicin (0.3%) or ofloxacin (0.3%) eyedrops or ointment in both eyes every 4 hours for 5–7 days.
- Counsel caregivers on home treatment and the importance of hygiene measures (see viral conjunctivitis above) and advise to:
  - — Clean the child's eye with a clean cloth before applying the prescribed antibiotic drops or ointment every 4 hours.
  - — Return after 2–3 days or earlier if the child's condition worsens.
- Depending on local legislation, advise the child not to go to school or kindergarten during the episode.

Allergic conjunctivitis

- Avoid exposure to seasonal pollens or allergen when possible.
- For mild cases, give artificial tears and advise application of cool compresses.
- For moderate cases (if symptoms do not improve with the above supportive measures):
  - — Give topical antihistamines such as azelastine (0.05%), ketotifen (0.025%) or olopatadine (0.1%) eyedrops: one drop in both eyes 2 to 4 times a day as needed for no longer than 4 weeks.
  - — Consider short-term use of oral antihistamines such as loratadine, in addition to or instead of topical antihistamines.

- In severe or resistant allergic disease, consider referral to a specialist.

Systemic conditions

- Follow the specialist's treatment plan.

Noninfectious noninflammatory conjunctivitis

These conditions usually improve within 24 hours. Treat according to the underlying cause:

- If chemical exposure, wash thoroughly with saline and consider assessment by an ophthalmologist.
- If mechanical, give topical lubricants (drops or ointments). In more severe cases, consider temporarily taping eyelids shut and advise to wear a protective shield when sleeping. In case of foreign body, see p. 452.
- If contact lenses, suspend contact lens use.
- If associated with medication, discontinue the causative drug, whenever possible. Consult a specialist when needed.

Keratitis

Keratitis is the inflammation of the cornea due to infection (e.g. herpes simplex, adenovirus, measles, *S. pneumoniae*, *S. aureus*, *Pseudomonas* sp., acanthamoeba) or reaction to chemicals.

History and examination

- Cornea: swollen, hazy/clouding, localized opacity
- Severe eye pain
- May present with reduced vision
- Use of contact lenses.

Treatment and referral

- Refer to the ophthalmologist to confirm diagnosis and to establish a treatment plan.
- Follow the specialist's treatment plan including specific antibiotics for bacterial or fungal infections, aciclovir for herpes infection, keratoplasty.
- Treat pain with paracetamol or ibuprofen as needed (p. 506).

Uveitis

Uveitis is inflammation of the uvea, the membrane inside the eye, usually due to systemic conditions such as juvenile idiopathic arthritis, reactive arthritis, sarcoidosis or inflammatory bowel disease. It is often recurrent and can lead to blindness.

History and examination

- Pupil: constricted (myosis), irregular, poor light response
- Adhesions of the iris
- Red around the cornea (ciliary injection)
- Can be unilateral or bilateral
- Eye pain, photophobia
- Reduced vision.

Treatment and referral

- Refer to the ophthalmologist to confirm diagnosis.
- Follow the specialist treatment plan for uveitis and the primary systemic disease.

(Epi-)scleritis

(Epi-)scleritis is inflammation of the (epi-)sclera. This is mainly caused by idiopathic autoimmune diseases, e.g. systemic lupus erythematosus, Henoch-Schönlein purpura.

History and examination

- Redness of the sclera, around the cornea (ciliary injection) with blood vessels bigger than in conjunctivitis
- Mostly unilateral
- Localized pain
- Minimal watery discharge.

Treatment and referral

- (Epi-)scleritis is self-limiting.
- Consider referral to an ophthalmologist, who may advise on topical steroids for fast relief.

Foreign body

History and examination

- History of small object hitting the eye, trauma, or use of contact lenses
- Gritty feeling, foreign body sensation
- Severe eye pain, photophobia, irritability in small children
- Usually unilateral
- Foreign body can be visible or of microscopic size (flip up the upper lid for appropriate assessment)
- Corneal ulceration.

Treatment and referral

- If you detect a corneal foreign body, attempt to remove it by irrigation, if needed, after instillation of topical anaesthetic.
- Refer urgently to the ophthalmologist if you cannot remove the foreign body and if there are signs of penetrating trauma, corneal ulceration or keratitis.

6.19.3 Inflammation around the eye

Inflammation of the lacrimal gland (dacryoadenitis) and nasolacrimal sac (dacryocystitis) can present with inflammation around the eye.

Cellulitis is an infection of the soft tissue around the eye, either anterior to the orbital septum (preseptal), or posterior to the orbital septum. The latter is less common but can lead to severe intracranial complications.

History

- Onset of the inflammation, development, spread, associated symptoms
- Trauma such as skin laceration, infected insect bites
- Sinusitis
- Facial or dental infection
- Upper respiratory infection
- Eye surgery or sinus surgery.

Examination

Assess:

- Location and extent of the inflammation

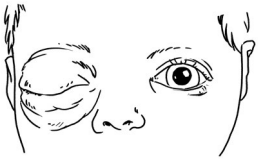
- Associated signs of the primary infection, e.g. nasal discharge and bleeding with sinusitis, periodontal pain and swelling with dental abscess
- Visual acuity (p. 439)
- Eye movement in all directions and alignment (p. 439)
- Diplopia (double vision)
- Ocular surface, eyelid and orbit
- Pupil reaction to light.

Preseptal cellulitis

Preseptal cellulitis is more common in young children and usually mild. It is caused by an infection mostly spreading from a superficial location.

History and examination

- History of local facial injuries, insect or animal bites, conjunctivitis, chalazion
- Eyelid swelling and erythema
- Pain on touching
- Vision not affected
- Fever (less common than with orbital cellulitis).



Complication

- Eyelid abscess.

Treatment

- Give oral amoxicillin-clavulanate 25 mg/kg amoxicillin twice a day or cefuroxime axetil for 7–14 days.

Follow-up

Ask the caregivers to return after 48–72 hours for follow-up or earlier if the child worsens.

Referral

Refer to hospital for IV antibiotic treatment if:

- < 1 year of age
- Unable to tolerate oral medication

- Rapidly evolving infection, child looks ill
- Failed outpatient treatment after 2–3 days of oral antibiotics.

Orbital cellulitis

Orbital cellulitis is more common in adolescents. The infection is mostly spread from an upper respiratory tract infection (sinusitis), dental infection or local trauma. The main pathogens involved are *S. pneumoniae* and *S. aureus*.

! Orbital cellulitis has the potential to lead to severe disease.
Rule out meningeal involvement (nausea, vomiting and drowsiness) and other severe complications!

History and examination

- History of an upper respiratory tract infection (sinusitis), dental infection or local trauma
- Proptosis (eyeball protrusion)
- Limited, painful ocular movement
- Reduced or double vision
- Fever, malaise
- Headache, lethargy.

Complications

Orbital cellulitis can lead to serious complications such as meningitis, sinus venous thrombosis, intracranial extension of infection, subperiosteal abscess and loss of vision.

Treatment and referral

- **Refer urgently** to hospital if suspected or confirmed orbital cellulitis for further investigations (blood analysis and imaging) and IV antibiotic treatment.
- Consider giving the first dose of IV or IM ceftriaxone 50 mg/kg/dose before referral if referral expected to be significantly delayed.

Dacryoadenitis

Inflammation of the lacrimal gland caused by an infection (*S. aureus*, *S. pneumoniae*, cytomegalovirus, measles, Epstein-Barr virus, enteroviruses), trauma, rarely sarcoidosis or leukaemia. Not common in childhood.

Symptoms

- Swelling and redness over gland area (upper outward lid)
- Pain, tenderness in the lid
- Mucopurulent eye discharge
- May be associated with fever.

Complications

Preseptal (p. 453) or orbital cellulitis (p. 454) or orbital abscess.

Treatment and referral

- Give oral amoxicillin-clavulanate 25 mg/kg amoxicillin twice a day (max. 3 g/day) or cefuroxime axetil for 7–14 days.
- Refer for drainage if there is an abscess.

Dacryocystitis

Acute bacterial infection or inflammation of the nasolacrimal sac due to congenital or acquired nasolacrimal duct obstruction (for dacryostenosis, see p. 457). Common pathogens are *S. aureus*, coagulase-negative staphylococci, *H. influenzae*, *S. pneumoniae*.

Symptoms

- Swelling and redness of the nasal side of the lower eyelid over the lacrimal sac
- Tenderness, pain
- Eye discharge in the areas of lacrimal duct (inferomedial to inner corner of the eye)
- Tearing (epiphora)
- Possible orbital cellulitis.

Treatment and referral

- Advise application of warm, wet compresses four times a day
- Give oral amoxicillin-clavulanate 25 mg/kg amoxicillin twice a day for 7–14 days or cefuroxime axetil (see dosages in Annex 4)
- Consider referral for surgical drainage.

DO NOT probe the lacrimal duct during acute infection as it may cause spread of bacterial infection!

6.19.4 Inflammation of the eyelid

Blepharitis

Inflammation of the eyelid glands due to infection with *S. aureus* or rarely due to a dysfunction of the meibomian gland.

Symptoms

- Eyelids red, swollen and itchy
- Crusting of eyelashes, eyelids sticking together after sleep
- Burning sensation
- Gritty feeling, foreign body sensation
- Eye pain
- Photophobia
- Tearing.

Complications

Hordeolum and chalazion (see below).

Treatment

- Give topical antibiotics such as azithromycin (1.5%), gentamicin (0.3%) eyedrops or ointment
- Counsel on eye hygiene measures, advise daily cleaning of the eyelids with gentle warm massage.

Hordeolum (Stye)

External hordeolum is caused by an infection of the Zeiss glands in the lid margin, while an internal hordeolum is caused by an infection of the meibomian glands in the eyelid.

History and examination

- Small and painful lump on the eyelid
- Eyelid may be red and swollen
- May evolve to abscess with yellow discharge
- Internal hordeolum: moderate, more diffuse swelling; often points towards the inside of the eyelid
- External hordeolum: swelling is smaller and superficial.

Treatment and referral

- Give topical antibiotics such as azithromycin (1.5%), gentamicin (0.3%) eyedrops or ointment.
- Counsel application of warm, wet compresses four times a day.
- If an abscess forms, refer for drainage.

Chalazion

Chronic infection of the meibomian glands due to blockage of normal drainage.

Symptoms

- Localized bump that develops slowly
- No pain, no redness.

Treatment and referral

- Advise application of warm, wet compresses four times a day and proper lid hygiene.
- Refer to a specialist if symptoms persist after several weeks.

6.19.5 Excessive watering of the eye

Excessive watering of the eye or excessive tearing (epiphora) suggests a problem with the nasolacrimal duct, usually with narrowing or obstruction of the duct.

Dacryostenosis

Dacryostenosis is caused by obstruction of the lacrimal sac or nasolacrimal duct. It is commonly congenital and occasionally acquired.

History and examination

- Excessive tearing within 2–4 weeks of birth (congenital)
- For acquired: history of chronic conjunctivitis, trauma, granulomatous diseases, e.g. sarcoidosis, granulomatosis with polyangiitis
- Mostly unilateral, can be bilateral
- Symptoms of underlying disease in acquired cases.

Complications

Acute or chronic dacryocystitis (p. 455).

Treatment and referral

- Most congenital cases will resolve spontaneously or with the help of lacrimal sac and nasal passage massage and warm compresses.
- In refractory congenital cases (after a few months), refer to ENT specialist for dilation or stenting of the duct.
- In acquired cases: treat underlying disease.

Glaucoma

Glaucoma is a group of eye diseases leading to increased intraocular pressure. They are rare during infancy and childhood, but threaten vision. Glaucoma can lead to destruction of the optic nerve due to increased intraocular pressure. Early diagnosis is crucial.

History and examination

Symptoms of glaucoma vary greatly depending on the age and intraocular pressure elevation:

- "Classic triad" in primary infantile glaucoma:
  - — Excessive tearing (epiphora)
  - — Light sensitivity (photophobia)
  - — Involuntary tight closure of the eyelids (blepharospasm)
- Vision loss
- One eye appears larger than the other
- Opacification or enlargement of cornea.

Referral

Refer to an ophthalmologist for further investigation and treatment.

6.19.6 White pupil (leukocoria)

Retinoblastoma

Retinoblastoma is a rare primary intraocular malignancy in children.

! Leukocoria should be considered a retinoblastoma until proven otherwise.

History and examination

- Common age of onset < 3 years
- White pupillary reflex detected in photographs or as the absence of a red reflex on clinical examination during well-child visit at birth–72 hours (p. 24), 1 week (p. 28) or 1 month (p. 30)
- Persisting strabismus after 3 months of age
- Loss of vision
- Usually unilateral, rarely bilateral
- Painful, red eye
- Fundus examination: greyish-white, vascularized retinal tumour.

Referral

Urgently refer all children with leukocoria to an ophthalmologist for further investigation and treatment.

Cataract

Cataract is an opacification of the lens. Cataract can be congenital (hereditary, congenital infections including rubella, hepatitis, mumps, toxoplasmosis) or acquired (drug-induced, e.g. long-term glucocorticoid treatment, ocular trauma, radiation, diabetes, Down syndrome).

History and examination

- Congenital cataract:
  - Leukocoria (white pupillary reflex) detected in photographs or as an absent red reflex on clinical examination
  - Strabismus
  - Nystagmus

- Reduced visual acuity
- Painless and often bilateral, grey-white clouding of the lens.

Referral

Refer urgently to an ophthalmologist to confirm the diagnosis and management.

6.20 Headache

Headaches are common in children and increase from childhood to adolescence. The main purpose of the diagnostic approach is to differentiate primary headaches from secondary ones which might need specific diagnosis and management (Table 76, p. 462).

History

- Onset abrupt or progressively worsening
- Frequency and time of day, triggers
- Unilateral, bilateral diffuse, or occipital
- Pulsatile or nonpulsatile, feeling like a band around the head
- Associated symptoms:
  - Fever
  - Vomiting
  - Cough, ear symptoms
  - Phonophobia (sound sensitivity), photophobia (light sensitivity)
  - Decreased vision, new onset of squint
  - Seizures
  - Headache preceded by an aura, e.g. sensation of flashing lights, a gleam of light, blurred vision
  - Headache associated with changes in posture: lying down, standing up and Valsalva manoeuvre
- Symptoms of raised intracranial pressure:
  - Headaches and vomiting on waking
  - Nausea, vomiting, drowsiness, irritability or confusion, double vision
- Social issues, situation at home
- Personality change
- Physical activity, adequate sleep and hydration

- Previous use of medication against headaches (drugs, dose, frequency)
- Medical history: history of head or neck trauma, HIV infection, sickle cell disease, neurosurgery or ventriculoperitoneal shunt
- Recent travel: exposure to arboviruses.

Examination

Perform a physical examination including neurological and ear, nose and throat examination. Perform fundoscopy, if possible. Look for:

- Facial tenderness on palpation, inflamed mucosa and purulent nasal discharge
- Tenderness at temporomandibular joint or temples on palpation
- Dental caries, gingival disease, or oral abscess
- Skin lesions: port-wine stain birthmark (p. 148), café-au-lait spots, neurofibromas, light ash-leaf spots
- Decreased visual acuity (p. 442)
- Growth rate of head circumference faster than normal (measure in all children)
- Signs of raised intracranial pressure: hypertension, bradycardia and irregular breathing (Cushing's triad)
- Petechiae or purpura
- Meningeal signs: neck stiffness, photophobia (light-sensitivity)
- Altered mental status, reduced conscious state, ataxia, reduced muscle tone and strength, absent reflexes, unstable gait, abnormal findings on examining cranial nerves
- Overweight or obesity
- Hypertension
- Fever.

Investigations

Investigations are usually not required, unless there are red flag symptoms.

RED FLAGS: refer immediately to the hospital if there are:

- Meningeal signs: neck stiffness, photophobia
- Severe headache with abrupt onset
- Increasing frequency of severe headaches
- Consistent location of recurrent headaches
- < 6 years of age
- Headache awakens the child or adolescent
- Signs and symptoms of raised intracranial pressure
- Altered mental status, marked lethargy or change in behaviour
- Seizures or convulsions
- Presence of ventriculoperitoneal shunt or previous neurosurgery
- Severe hypertension.

Differential diagnosis

Note: patients with known tension or migraine headaches may also develop headaches due to other acute causes.

Table 76. Differential diagnosis of headache

Diagnosis	In favour
Common causes	
Viral illness including acute sinusitis (p. 217) and common cold (p. 181)	• Frontal headache • Nasal discharge • Fever, cough, fatigue, dental pain, ear pain or fullness, nasal obstruction, halitosis, facial tenderness on palpation.
Tension-type headache (p. 466)	• Mild or moderate headache that is bilateral, diffuse or posterior in location and nonpulsatile, feels like a band around the head • No features of migraine • No nausea, no vomiting • Normal neurological examination • Tenderness on palpation of the head • Trigger points may be identified in the neck.

Diagnosis	In favour
Common causes	
Migraine (p. 467)	• Recurrent headache, often preceded by an aura, e.g. visual symptoms: flashing lights, zigzag lines resembling forts or blind spots, blurred vision • Unilateral, pulsatile headache • Photophobia • Nausea, vomiting, abdominal pain • Eye tearing, red eyes, possibly periorbital oedema • Word-finding difficulties • Weakness.
Vision problems (p. 442)	• Decreased visual acuity due to refractive errors (p. 442) • Squinting in order to focus • Tiredness, headaches, problems concentrating • Difficulty in seeing the blackboard or watching television.
Uncommon causes	
Idiopathic intracranial hypertension (pseudotumor cerebri)	• Headache (moderate to severe) • Vision problems, ringing in the ears (tinnitus) on heartbeats • Nausea, vomiting • Overweight or obese • More common in girls.
Dental caries, gingival disease or abscess	• Pain typically localized to the mouth; may present as facial pain or headache.
Post-concussion headache	• History of head trauma • Lucid period between trauma and onset of headache • Can associate dizziness, nausea, blurred vision, sleep disturbances • May last for months.

Diagnosis	In favour
Uncommon causes	
Meningitis (p. 235)	• Fever • Photophobia, phonophobia • Neck stiffness • Irritability • Petechiae/purpura • Convulsion(s), reduced level of consciousness • Vomiting.
Encephalitis	• Focal seizures • Fever, exposure to infectious agent (e.g. herpes or arboviruses) • Altered mental status ranging from minor deficits to complete unresponsiveness; focal motor or sensory neurological irregularities; speech problems; exaggerated deep tendon or pathological reflexes.
Temporo-mandibular joint syndrome (p. 466)	• Constant, throbbing pain, often with grinding of teeth and other jaw movements • Pain triggered by jaw movement or pressure on the jaw muscles • Jaw click or reduced movement.
Vascular malformation	• Abrupt onset of headache • Altered mental status • Focal neurological signs.
Neurocutaneous syndromes	• Family history • Skin lesions, e.g. port wine stain birthmark, café-au-lait spots, neurofibromas, light ash-leaf spots • Seizures • Vision problems • Learning problems.
Hypertensive encephalopathy (p. 344)	• Severe headache • Raised blood pressure • Symptoms and signs of raised intracranial pressure.

Diagnosis	In favour
Uncommon causes	
Ischaemic stroke and intracranial haemorrhage	• Abrupt onset of headache • Focal seizures • Symptoms of raised intracranial pressure: irritability, vomiting, focal neurological signs, altered consciousness.
Brain tumour	• Persistent vomiting or nausea • Recurring headache, particularly when waking up • Atypical eye movements, blurred/double vision • Fits or seizure • Meningism and photophobia • Behavioural change, especially lethargy • Problems with balance, walking, coordination • Abnormal head position such as head tilt.

Treatment and referral

- Treat according to the diagnosis or underlying cause. See page references in table above.
- Refer **urgently** if any signs of:
  - — Idiopathic intracranial hypertension (pseudotumor cerebri)
  - — Meningitis, encephalitis
  - — Trauma-associated headaches
  - — Vascular malformation
  - — Ischaemic stroke and intracranial haemorrhage
  - — Neurocutaneous syndromes
  - — Hypertensive encephalopathy
- If needed, refer to specialist according to suspected underlying condition for confirmation and management.
- Refer to dentist if dental caries, gingival disease or abscess.

Follow-up

- Review if symptoms persist in 5 days for those not requiring immediate referral.

- Advise caregivers to return sooner if the child or adolescent worsens.
- Refer to a specialist children and adolescents with continuing headaches at follow-up.
- Review children that have a specific disease or condition and follow specialist's treatment plan.

6.20.1 Temporomandibular joint syndrome

- Counsel to use heat packs for the affected area.
- Counsel to eat soft food and avoid wide opening of the jaw.
- Give nonsteroidal anti-inflammatory drugs such as ibuprofen for pain control, as needed (p. 508).
- Refer to dentist if no improvement after 1–2 weeks.

6.20.2 Tension-type headache

The prevalence of tension-type headache increases with age. It is more frequent in girls.

Diagnosis

The diagnosis is based on the following clinical diagnostic criteria, and at least 10 episodes of headache:

- Each episode lasting between 30 minutes and 7 days
- At least 2 of the following:
  - Bilateral
  - Pressing or tightening, non-pulsating
  - Mild or moderate intensity
  - Not worsening on physical activity (e.g. walking, climbing stairs)
- Both of the following:
  - No nausea or vomiting
  - No photo- or phonophobia.

Tension-type headache is not localized, not throbbing, not severe and does not worsen during physical activity.

Tension-type headache is classified as:

- Infrequent: < 1 headache day per month, occurring < 12 days per year
- Frequent: 1 to 14 headache days per month for more than 3 months, occurring ≥ 12 to < 180 days per year
- Chronic: ≥ 15 headache days per month, or ≥ 180 days per year.

Treatment

- Give paracetamol or ibuprofen for pain control as needed during the acute phase (p. 508).
- Reassure the adolescent and caregiver. Acknowledge the pain, explain the course of the condition.
- Counsel on how to avoid headache triggers:
  - Drink enough water, ensure regular meals (including breakfast), physical activity and good quality sleep.
  - Avoid caffeine, tobacco and alcohol, and limit screen time.
  - Reduce stress.

6.20.3 Migraine

Migraine is common in both girls and boys. It may occur with or without aura. An aura consists of transient focal neurological symptoms preceding or accompanying the headache.

Diagnosis

The diagnosis is based on the following clinical diagnostic criteria:

Migraine without aura

- A. At least 5 attacks fulfilling criteria B–D
- B. Headache attacks lasting 2 to 48 hours (untreated or unsuccessfully treated)
- C. Headache has ≥ 2 of the following characteristics:
  - Unilateral
  - Pulsating
  - Moderate or severe intensity
  - Aggravated by or causing avoidance of routine physical activity (e.g. walking, climbing stairs).

- D. During headache, ≥ 1 of the following:
  - Nausea, vomiting or both
  - Photophobia and phonophobia.

Migraine with aura

- A. At least 2 attacks fulfilling criteria B and C
- B. ≥1 of the following fully reversible aura symptoms:
  - Visual
  - Sensory
  - Speech or language
  - Motor
  - Brainstem
  - Retinal.
- C. ≥ 3 of the following characteristics:
  - ≥ 1 aura symptom spreading gradually over ≥ 5 minutes
  - ≥ 2 symptoms occur in succession
  - Each individual aura symptom lasts 5 to 60 minutes
  - ≥ 1 aura symptom is unilateral
  - ≥ 1 aura symptom is positive (scintillations and pins and needles)
  - The aura is accompanied or followed within 60 minutes by headache.

Treatment

The aim of the treatment is to reduce the frequency, duration, and severity of migraine attacks.

Acute treatment

Early treatment during the migraine attack is important.

- Give paracetamol or ibuprofen for pain control, as required. Medication should not be used more than 14 days per month. If paracetamol and ibuprofen are ineffective, consider referral to a specialist for assessment and potential start of triptans in children > 12 years of age.
- Advise rest or sleep in a dark, quiet room when migraine develops.
- If nausea and vomiting are prominent and disturb sleep, consider giving an anti-emetic such as ondansetron at 0.15 mg/kg, as a single dose. Be aware of potential adverse effects of ondansetron (cardiac effects and

increased transit time). Do not give metoclopramide as it causes severe side-effects in children.

Preventive treatment

- Counsel on how to avoid headache triggers:
  - Drink enough water, ensure regular meals (including breakfast), physical activity and good quality sleep.
  - Avoid caffeine, tobacco and alcohol, and limit screen time.
  - Reduce stress.
- If the frequency and severity of migraine attacks interfere with schooling and social life, refer to a specialist to consider prophylactic drug therapy (propranolol, topiramate).

6.21 Seizures

The most common type of seizure in children is due to a fever (febrile seizure, p. 474).

Epileptic seizures are caused by excessive brain activity, which is intermittent and usually self-limiting, and can last seconds to several minutes.

Epileptic seizures can be classified into:

- *Focal seizures* affect one side of the brain and may present with or without awareness and with either focal motor seizures (with movement) or with sweating or visual and auditory symptoms.
- *Generalized seizures* affect both sides of the brain and may present as bilateral motor seizure (with visible movement such as muscle twitching and spasms) or non-motor (absence) seizure (Table 78, p. 477).

Epileptic seizures may be:

- *Provoked (symptomatic):* result of an acute condition, e.g. hypoglycaemia (p. 602), electrolyte imbalance, fever (p. 225), meningitis (p. 235), encephalitis, head trauma, medicines, drug use (amphetamines or cocaine).
- *Unprovoked (idiopathic):* absence of an acute underlying condition.

Epilepsy (p. 476) is diagnosed if two or more unprovoked epileptic seizures occur more than 24 hours apart.

Status epilepticus is a seizure lasting longer than 5 minutes, or more than 1 seizure within a 5-minute period, without returning to a normal level of consciousness between episodes.

! **Status epilepticus** is an **EMERGENCY. Treat immediately** (p. 727).

History

- Description of episode: duration, description of movements, urination, open (epileptic seizures) or closed eyes (nonepileptic seizures)
- Events surrounding episode: fever, injury, trauma, ingestion, underlying conditions
- Postictal assessment (mental status, residual focal deficits)
- Other symptoms: headache, nausea, vomiting, visual changes, behavioural changes, loss of consciousness
- Developmental history
- Family history of epilepsy
- Medication intake, drug use
- History of head trauma
- History of recent travel.

It may be helpful to ask the caregivers to record a video of an episode, as it can help to confirm an epileptic seizure and its type.

Examination

During a seizure episode: monitor vital signs, assess and manage ABCDE (p. 716) and treat the convulsions (p. 727).

Perform a physical examination including a detailed neurological examination. Look for:

- Level of consciousness (AVPU: alert, responds to voice, responds to pain, unconscious)
- Irregular eye movements, nystagmus, nonreactive pupils or unequal pupil size
- Meningeal signs:
  - < 1 year of age: irritability during head or leg examination or bulging fontanelle

— > 1 year of age: neck stiffness.

- Signs of trauma (fractures, bruises and other injuries)
- Fever
- Reduced muscle tone and strength, absent reflexes, unstable gait.

Differential diagnosis

Differentiate epileptic seizures (p. 476) from nonepileptic events (Table 77). Nonepileptic events resemble epileptic seizures but are not caused by abnormal brain activity (electroencephalogram is normal). The eyes are usually closed during a nonepileptic event whereas during epileptic seizures the eyes are open.

Table 77. Differential diagnosis of nonepileptic events by age

Diagnosis	In favour
Infants and children	
Breath-holding spells (p. 340)	• Healthy children • Starting between 6–24 months and lasting up to 6 years of age • Triggered by pain, anger or fear • Cyanosis or pallor • Breath-holding prior to loss of consciousness.
Jitteriness	• Newborns < 1 month of life • Excessive startle response to touch or noise • Regular back-and-forth movement • Newborn is awake and looks well.
Benign neonatal sleep myoclonus	• First weeks of life, self-limited to first 2–3 months • Repetitive, symmetrical and bilateral myoclonic jerks of the arms or legs • Only during sleep, ceases when roused.
Nightmares, night terrors	• Typically 5–7 years of age, ends before adolescence • Sudden awakening with agitation and fear including facial expressions, vocalization, sweating, tachycardia, and spontaneous return to sleep.
Syncope (p. 337)	• Loss of consciousness, abrupt onset, short duration • Spontaneous complete recovery.

Diagnosis	In favour
Infants and children	
Psychogenic nonepileptic seizure	• Older children with depression or anxiety • Episodes of movements (shaking, pelvis thrusting) that mimic general seizures but conscious and tightly closed eyes.
Opisthotonic posturing (p. 306)	• Infants with back arching and dystonic neck posturing (Sandifer syndrome) • Effortless regurgitation and vomiting after feeding or eating due to gastroesophageal reflux.
Rage attacks	• Sudden, out-of-control bursts of anger: yelling or shouting, intense anger, physical aggression • Rarely linked with limbic seizures.
Shuddering spells in infancy	• Uncommon harmless condition in infants and young children • Movements resemble shivering and straining, last a few seconds: infant stares, appears disconnected from the surroundings and then promptly returns to normal • Normal consciousness • Never during sleep, usually when child is feeding or getting excited or distressed.
Adolescents	
Migraine (p. 467)	• Recurrent headache • Basilar-type migraine can present with loss or alteration of consciousness, visual hallucinations, blindness, hemiparesis, ataxia.
Tics	• Sudden brief, rapid but complex movements or sounds, sometimes repetitive • Tics may be suppressed when distracted.
Stereotypies	• Repetitive movements or postures, e.g. head banging, body rocking, hand flapping, crossing and uncrossing legs • May be suppressed consciously or when distracted • More common in children with autism (p. 569), schizophrenia (p. 545) or mental problems (p. 645).

Investigations

For a first seizure with unclear cause in children who have not returned to a normal level of consciousness and newborns, consider the following investigations to rule out an acute cause. Refer if needed:

- Full blood examination including CRP, glucose, urea, creatinine, electrolytes, blood gases, toxicology screen.
- Lumbar puncture if suspected meningitis or encephalitis after exclusion of a space-occupying brain lesion by thorough neurological assessment (or brain imaging if appropriate).
- If an acute cause is not identified after the above initial investigations, this may be an unprovoked seizure. Refer to a specialist for further investigations, such as electroencephalogram and neuroimaging.

Referral

- Refer urgently for neuroimaging in the event of focal seizure, new focal neurological findings on examination or prolonged altered level of consciousness following the seizure.
- Consider referral to hospital depending on the underlying cause of a provoked seizure. Children with febrile seizures and no residual signs after the acute episode do not need referral.
- Refer children with recurrent seizures without a diagnosis of epilepsy or with known epilepsy for potential adjustment of medication.

Treatment

- Stabilize the child and treat convulsions (p. 727).
- Treat according to the underlying cause:
  - — For management of febrile seizures, see p. 475
  - — Follow the specialist's plan in children with epilepsy (p. 476).
- Counsel the caregivers on what to do in the event of a seizure (Counselling box 35, p. 474).

Counselling box 35. First aid action plan for seizures

First aid action plan for seizures

- Stay calm. Stay with your child, comfort your child.
- Begin timing how long the seizure lasts. If the seizure lasts more than 5 minutes, call an ambulance.
- Move harmful objects away to protect your child from injury.
- If your child is having convulsions, do not try to stop them from moving, and do not put anything in their mouth.
- If your child is lying down:
  - Put something soft under their head and loosen anything that is tight around the neck.
  - Once the seizure is over, roll your child onto their side until they are ready to sit up unaided.
- Comfort your child with gentle caresses and soothing expressions, especially if confused, frightened or disoriented after the seizure.
- If your child has a known epileptic syndrome, give an anticonvulsant as prescribed.

6.21.1 Febrile seizures

Febrile seizures affect 2–5% of children between 6 months and 5 years, with a peak between 12–18 months of age. Most last from 3 to 5 minutes.

Febrile seizures are harmless and do not cause brain damage.

History and examination

- High fever
- Viral infection
- Recent immunization
- Family history of febrile seizures.

Simple febrile seizure

- Short, generalized seizure lasting < 15 min
- Not repeated within 24 h

- Taking place during a febrile episode not caused by an acute disease of the nervous system
- Aged 6 months to 5 years
- No neurological deficits.

Complex febrile seizure

- Focal, or generalized and prolonged, seizure, lasting > 15 min
- More than one seizure in 24 h
- Neurological deficits after seizure, e.g. brief period of paralysis after seizure
- Previous neurological deficits.

Investigations

- Consider investigations to identify the cause of fever (p. 229)
- Imaging and electroencephalogram are NOT indicated for simple febrile seizures
- Rule out meningitis (p. 235) if child is < 1 year of age or has history of recurrent prolonged seizures in the past 24 h.

Treatment

▶ Most febrile seizures are self-limiting and last < 5 minutes. If they last longer, follow Chart 12, p.727.

DO NOT give prophylactic anticonvulsant therapy to prevent febrile seizures or afebrile seizures.

▶ Reassure the caregivers and counsel on:

— How to care for a child with fever at home (Counselling box 25, p. 230)

— The harmless nature of febrile seizures (Counselling box 36, p. 476)

— What to do in the event of a seizure (Counselling box 35, p. 474).

Referral

Refer to hospital if:

- The diagnosis of febrile seizure is unclear
- It is the first complex febrile seizure (for observation after the acute episode and further investigations)
- You suspect meningitis or another serious cause of fever.

Refer to a specialist if frequent episodes.

Counselling box 36. Febrile seizures

Febrile seizures

Febrile seizures are convulsions that happen as a response of the brain to fever. They look serious but stop on their own after a few minutes and do not cause any problems. It does not mean that your child has or will develop epilepsy.

About 1 in every 3 children who have had a febrile seizure will have another one, usually within 6–12 months of the first episode. Most children outgrow having febrile seizures by the age of 5 years.

There is no specific measure to avoid febrile seizure. When your child develops high fever (≥ 39 °C) that causes distress, give paracetamol or ibuprofen.

Take your child to the doctor if your child:

- Has more than one seizure within 24 hours
- Is very sleepy or irritable
- Has severe headache or vomiting.

6.21.2 Epilepsy

Epilepsy is diagnosed if two or more unprovoked epileptic seizures occur more than 24 hours apart in the absence of illness, fever or acute brain injury.

Epilepsy syndromes

A variety of epilepsy syndromes occur in early infancy up to late adolescence (Table 78).

Management

▶ Refer to neurologist for classification of the epilepsy and prescription of medication.

Children and adolescents with epilepsy should live a normal life like any other child while following some safety measures.

Antiepileptics

The treatment goal is the absence of seizures without drug side-effects. In severe cases the treatment team has to find a balance between reducing

Table 78. Common childhood epilepsy syndromes

Epilepsy syndromes	Features
Benign Rolandic epilepsy	• Affects 15% of children with epilepsy • Starts between 3 and 10 years of age • Focal motor seizures without loss of consciousness (often at night) • May develop into generalized tonic-clonic seizures • Anti-epileptic drugs may not be necessary.
Childhood absence epilepsy	• Affects up to 12% of children with epilepsy • Starts between 4 and 10 years of age • Child may become unaware of surroundings or activities or stare into space for a few seconds • Responds well to medications • Children may outgrow it by 12 years of age.
Juvenile myoclonic epilepsy	• Starts between 12 and 18 years • Seizures can be myoclonic (upper body), generalized or absence seizures • Can happen after awakening • Tiredness, stress and alcohol may trigger seizures • Responds to medications • May continue into adulthood but if so, predisposition to seizures may only be slight.
Infantile spasms	• Can start in the first year of life • Brief spasms (jerks) in clusters, which may affect neck, arms, legs or the whole body • May be associated with subsequent long-term learning and behaviour problems.

the frequency of seizures and limiting drug side-effects to achieve the best possible quality of life for the child and their family.

- Follow the specialist's treatment plan. Use single drug therapy, if possible.
- Assess regularly for side-effects of anti-epileptic drugs in collaboration with specialist (Table 79).
- Monitor drug levels for phenytoin. Monitor drug levels of other anti-epileptics only if there are side-effects or when not responding to treatment.
- Assess compliance when not responding to treatment.

Table 79. Anti-epileptic drugs and monitoring considerations

Antiepileptic drug	Side-effects	Monitoring
Carbamazepine	Leukopenia, double vision, lethargy, ataxia, rashes, liver toxicity	Full blood count, liver enzymes, drug levels only if clinical concerns
Clonazepam	Tolerance, drowsiness, weight gain, excess salivation, cognitive problems	—
Ethosuximide	Nausea, abdominal pain	—
Gabapentin	Lethargy, dizziness, ataxia, rash	—
Lamotrigine	Rash, ataxia, double vision, headache	—
Levetiracetam	Behaviour changes	—
Oxcarbazepine	Drowsiness, hyponatraemia	Serum Na+
Phenobarbital	Hyperactivity, rash and Stevens-Johnson syndrome, drowsiness, cognitive problems	Drug levels only if clinical concerns
Phenytoin	Hypersensitivity, gingival hypertrophy, hirsutism, ataxia, lymphadenopathy, rash and Stevens-Johnson syndrome, lupus-like illness	Drug levels, as level rises non-linearly with increasing dose
Topiramate	Lethargy, confusion, glaucoma, low appetite, renal stones	—
Valproic acid	Liver toxicity, fatal liver necrosis, weight gain, thrombocytopenia, pancreatitis, hyperammonaemia (nausea)	Full blood count, liver enzymes, drug levels only if clinical concerns
Vigabatrin	Short-term: gastrointestinal problems, fatigue, confusion Long-term: visual field defects, behaviour changes.	Eye examination and periodic assessment by a specialist.

Counselling box 37. General safety for a child or adolescent with epilepsy and seizures

General safety for a child or adolescent with epilepsy and seizures

Parents or caregivers of children with epilepsy and seizures should:

- Know what to do in the event of a seizure and follow the first aid action plan.
- Inform the wider family and school. Make sure that anyone caring for the child knows what to do in the event of a seizure and has access to the action plan and any medication if required.
- Consider getting a medical identification bracelet or necklace for the child or adolescent to wear.
- Lower the maximum water temperature in the home to 50 °C. The cold taps should run before the hot taps. A plumber can help with this.

Children and adolescents with epilepsy and seizures should:

- Avoid any seizure triggers such as stress, lack of sleep or flashing lights in children with photosensitive epilepsy.
- Avoid activities involving heights unless supervision is ensured.
- Only swim in the presence of an adult who is a good swimmer.
- Take special care when using hot water or objects that can cause burns, e.g. irons, kettles, stoves, barbecues, campfires.
- Wear a helmet and protective when riding a bicycle or scooter.
- Take showers instead of baths.
- Take the medication as prescribed, and never stop the medication without consulting your doctor.

Adolescents should also:

- Not consume alcohol and other drugs, as they can trigger seizures and interact with the medication.
- Follow national guidelines when applying for a driving licence, e.g. be seizure-free for a specified period.

Counselling

- Counsel caregivers and the child or adolescent according to their evolving capacity, on general safety considerations (Counselling box 37). Emphasize the importance of taking the medication regularly and a healthy lifestyle.
- Develop an action plan together with the caregivers and the child or adolescent with easy and clear instructions on what to do if a seizure happens (Counselling box 35).
- Teach how and when to administer an anticonvulsant during a seizure, such as buccal midazolam.

6.22 Low and floppy muscle tone

Floppiness is a generalized hypotonia in infants. Acute-onset hypotonia can be a sign of cardiac failure, severe dehydration, sepsis or severe infection. Hypotonia that has been present for weeks or months may be a sign of a neurological condition.

History

- Duration: acute-onset or weeks or months
- Perinatal and birth history, including asphyxia, Apgar score
- Family history, e.g. neuromuscular conditions
- Known medical condition associated with floppiness, e.g. Down syndrome, cerebral palsy
- History of convulsions
- Food intake, e.g. honey.

Examination

In an infant, hypotonia manifests as:

- Frog-like position when lying on the back
- Decreased spontaneous movements
- Decreased muscle resistance on stretching.

Perform a physical examination including a thorough neurological examination. Look for:

- Fever
- Lethargy
- Growth failure

- Heart murmur (p. 325)
- Signs of dehydration (p. 275)
- Dysmorphic features
- Delayed motor development (p. 61)
- Mass on abdominal palpation.

Differentiate between central and peripheral hypotonia (Table 80) to help narrow the differential diagnosis (Table 81). Assess:

- Muscle tone: test resistance to passive movement
- Muscle strength: observe spontaneous movement and ability to move arms and legs against gravity
- Reflexes: deep tendon reflexes, newborn reflexes (p. 118), Babinski reflex (Firmly stroke sole of foot on the lateral edge. Sign is present if the big toe extends and the other toes fan out. This is normal in infants, but not in older children)
- Head lag: pull infant by the arms from supine to sitting position and observe head and arms during the manoeuvre.

Table 80. Differentiating central from peripheral hypotonia

	Central hypotonia	**Peripheral hypotonia**
Muscle tone	Muscle tone more reduced than strength	Muscle strength more reduced than tone
Muscle strength	Normal: active movement against gravity with full resistance	Absent or extremely reduced
Head lag	May be some	Significant
Deep tendon reflexes	Present	Absent (normal)
Babinski reflex	Positive	Negative
Newborn reflexes	Sometimes persistent	Absent
Possible causes	*Diseases of the central nervous system, e.g. cerebral palsy*	*Neuromuscular diseases*

Differential diagnosis

Table 81. Differential diagnosis of hypotonia

Diagnosis	In favour
Acute-onset hypotonia	
Heart failure (p. 328)	• History of heart disease or heart murmur • Very fast or slow heart beat • Enlarged neck veins in older children • Enlarged liver • Swelling of hands, ankles, face • Fine crackles in the lung bases.
Severe dehydration (p. 275)	• Irritability, lethargy, reduced level of consciousness, sunken eyes, slow return after pinching skin.
Sepsis or other severe infection	• Seriously ill-looking (lethargic, pale, reduced interaction) with no apparent cause • Fever, other signs of infection: respiratory distress (pneumonia), petechial or purpuric rash (meningococcal disease).
Intussusception	• Infant or young child • Abdominal mass • Vomiting • Looking ill • Sudden episodes of crying/pain with pallor and floppiness • Blood and mucus in stools (late sign).
Infant botulism	• 3 weeks to 6 months of age (often coinciding with the introduction of solid foods) • 1–4 days of lethargy, feeding difficulties and constipation • Deterioration with loss of head control, symmetrical weakness and facial weakness • Peripheral hypotonia (Table 80).

Diagnosis	In favour
Hypotonia that has been present for weeks or months	
Neuromuscular disorders, e.g. spinal muscular atrophy, muscular dystrophies, myopathies	• Most common sign: muscle weakness • Peripheral hypotonia (Table 80) • Suggestive family history • Other symptoms according to the condition.
Cerebral palsy (p. 578)	• History of preterm birth, birth complications, birth weight < 1500 g, hypoxic-ischaemic encephalopathy (birth asphyxia) • Central hypotonia (Table 80): truncal hypotonia and poor head control in the first months of life.
Genetic syndromes	• Dysmorphic features, e.g. in Down syndrome (p. 573), Prader-Willi syndrome, achondroplasia.
Endocrine abnormalities	• Hypoglycaemia, congenital hypothyroidism (p. 161).
Inborn errors of metabolism (p. 160)	• History of parental consanguinity, unexplained death of siblings, intrauterine growth restriction • Symptoms hours to day after birth that resemble central nervous system infection, sepsis or cardiac decompensation with nonspecific symptoms: poor feeding, lethargy, hypotonia, convulsions, abnormal breathing • Hypoglycaemia, acidosis.

Investigations

- In acute-onset hypotonia in an ill-looking child: check blood glucose
- If the child has a known condition associated with hypotonia (Table 81): no further investigations required to explain hypotonia
- In hypotonia that has been present for weeks with no obvious cause, refer to specialist for further investigations: imaging, metabolic and genetic testing, electromyogram, muscle and nerve biopsies.

Management

It is important to detect serious conditions in children with acute-onset hypotonia that need immediate referral and treatment from those that need referral to the specialist for diagnosis and development of a treatment plan.

Acute management

- In the event of acute-onset hypotonia in an ill-looking child, assess the child urgently, check glucose and treat the acute condition accordingly (e.g. hypoglycaemia, dehydration), and consider referral.
- Refer immediately to hospital if severe dehydration, suspected cardiac failure, sepsis or infant botulism (requires immediate administration of antitoxin).

Long-term management

Management depends on the underlying cause of hypotonia:

- Follow the specialist's treatment plan and provide regular follow-up depending on the condition.
- For children with chronic conditions, a multidisciplinary team including physiotherapy, occupational and speech therapy is essential.
- Different forms of supportive treatment may be required, such as gastrostomy tube for nutrition, ventilatory support, orthopaedic measures for motility.
- Secondary skeletal deformities are common and may be difficult to prevent even with aggressive bracing and other orthopaedic measures.
- Early physiotherapy is essential.

6.23 Injuries

Most injuries in children are preventable. See Unintentional injury prevention (pp. 106–110) for counselling messages on how to prevent road traffic injuries, burns, falls, poisoning and drowning.

DO NOT miss neglect, child maltreatment and bullying in any child presenting with injuries. Assess if the history is compatible with the injury (p. 637).

6.23.1 Wounds, cuts and grazes

Minor injuries like wounds and superficial injuries such as cuts and grazes in children are common. Many can be dealt with in primary care settings. They may be a source of great anxiety for family and child. The child is often fearful and in pain. The parents may be worried about scarring.

History

- Mechanism of injury
- Time of injury
- Other medical problems, e.g. chronic health conditions, immunosuppression, diabetes
- Any medications, e.g. steroids
- Tetanus immunization status
- Pain (pain scale p. 508).

For wounds due to animal bites, see p. 489.

Examination

Assess and manage ABCDE (p. 716) prior to assessing any injury.

Examine thoroughly:

- Superficial wounds that may present together with less obvious major injuries (blood loss, head injury, deliberate self-harm)
- Deep penetrating wounds
- Wounds with suspected foreign body
- Wounds with suspected damage to underlying structures.

Assess:

- Site, size and depth of the injury:
  - Site: scalp, facial and fingertip injuries bleed excessively but also heal well and quickly; infection more likely in dirty areas. i.e. foot
  - Size: determines wound management (suturing, glue, Steri-strip)
  - Depth: inspect all wounds for damage to underlying structures (bones, nerves, blood vessels, tendons and ligaments)
- Pulses, capillary refill, skin colour (pallor), temperature, sensation, and motor function
- Signs of wound infection: pain, swelling, redness, warmth and pus drainage.

Investigations

- X-ray if the injury has involved glass. If a piece of glass has been removed a further X-ray must be taken to ensure complete removal.

Treatment

- Stop any bleeding (p. 743).
- Assess and manage pain (p. 506).
- Consider the need for anxiolytic medication, e.g. diazepam 0.2 mg/kg as a single oral dose or midazolam.

Preventing infection

- Clean all wounds, cuts and grazes thoroughly with saline and antiseptics (povidone-iodine 10% solution or chlorhexidine gluconate 1.5%).
- When needed, proceed with mechanical debridement to remove dirt particles (e.g. embedded tarmac or grit) and any foreign body before

closure: give local anaesthetic (lidocaine 1% without epinephrine (adrenaline)) by infiltration prior to debridement.

- Most wounds do not need antibiotics. Consider oral antibiotics such as amoxicillin-clavulanate (see dosages in Annex 4) for 3 days for high-risk wounds only: wounds older than 12 hours or penetrating deep into tissue, e.g. a dirty stick, knife wound, animal bites.

Treating wound infections

- Open the wound if pus is suspected.
- Clean the wound with antiseptics (povidone-iodine 10% solution or chlorhexidine gluconate 1.5%).
- Pack the wound lightly with damp sterile gauze: change the dressing every day and more frequently if needed.
- Give oral cloxacillin 15 mg/kg 4 times a day or cephalexin to treat possible *S. aureus* or amoxicillin-clavulanate 25 mg/kg amoxicillin twice a day if suspicion of remaining dirt or foreign body until surrounding cellulitis has resolved (usually 5–7 days).

Wound closure

- Consider closing the wound. See Annex 2 for indications and practical tips on closure techniques such as sutures, tissue glue and adhesive strips.

DO NOT close contaminated or infected wounds, or wounds that are older than 12 hours (24 hours, if on the face): leave them open for healing.

- Ensure proper dressings to avoid risk of further contamination:
  - — Face wounds: usually do not need to be covered
  - — Fingertip injuries: close wound with adhesive strips (p. 787), a good bandage and elevation
  - — Other sites: apply bandaging, make sure it is applied well but not too tightly
  - — Wound over a joint: consider splinting with a large crepe bandage
  - — Grazes: cover with a non-stick dressing. If oozing they need to be changed every 24–48 hours
  - — Very superficial grazes: leave open and apply an antiseptic (e.g. povidone).

Tetanus immunization status

▶ Ensure tetanus immunization status is up to date:

- If the basic tetanus immunization is incomplete or the previous tetanus vaccination was given more than 5 years ago, give a booster tetanus vaccination.
- For a high-risk wound (e.g. contaminated with dirt, faeces, soil or saliva, burns, deep puncture wounds), if the basic tetanus immunization is incomplete, give antitetanus serum too, if available.

Follow-up

Ask the caregivers to return after 4–5 days for follow-up, look for possible wound infection (see examination and treat accordingly) and ensure progression to a clean injury.

Referral

Refer to a specialist if:

- Wound in a challenging area (border of lip, eyelid) or where scarring ought to be avoided, i.e. face.
- Wound affects nailbed, in order to prevent long-term nail growth deformity.
- Wound with suspected damage to underlying structures.

6.23.2 Blunt injuries

Blunt impact injuries such as bruises (contusions) and haematomas are common and result from direct contact of a blunt object with the body. Bruising occurs when blood pools under the skin after an injury. Hematomas are more serious bruises that cause pain and swelling and are larger and deeper.

! Be alert for signs of child maltreatment (p. 637): unusual bruises, of different ages and in unusual sites with no clear history.

Examination

Rule out a fracture (p. 498).

Treatment

- Advise application of an ice pack for the first four hours. DO NOT apply ice directly to the skin and do not leave it in place for longer than 20 minutes in the hour.
- Advise rest for 24 hours and elevation of the affected limb. Prescribe crutches, as needed. **Note:** small children may not tolerate crutches and often resist rest, and in any case are unlikely to come to further harm. DO NOT restrict movement by force.

6.23.3 Animal bites and envenoming

Animal bites in children are common. Human bites are also possible.

All deep bites from animals (dogs, cats, monkeys) including human bites must be treated as dirty wounds. Human and dog bites carry anaerobic and aerobic bacteria. Cats can carry *Pasteurella multocida* in their mouths which can cause severe infection. A large animal such as a big dog can cause extensive crush injury to surrounding tissues and underlying bony injury may also occur.

History

- Type of bite (animal, human)
- Size of the animal, origin and animal behaviour (domestic or stray dog, provoked or unprovoked attack)
- Details of incident
- Tetanus and rabies status of the animal
- Tetanus immunization status of the child.

Examination

Assess and manage ABCDE (p. 716).

Irrigate and inspect the wound. Look for:

- Damage to superficial and deep structures (vessels, nerves, tendons, joints, bones)
- Signs of wound infection: pain, swelling, redness, warmth and pus drainage.

Investigations

- X-ray if a fracture or a foreign body is suspected.

Treatment

- Assess and manage pain (p. 506).
- Consider the need for anxiolytic medication, e.g. diazepam 0.2 mg/kg as a single oral dose or midazolam.
- Give tetanus vaccine booster and antitetanus serum when indicated (p. 488).
- If the animal shows signs of rabies (abnormal behaviour, paralysis, seizure) or dies in the next few days, or if bitten by wild animals such as bats, provide rabies prophylaxis (vaccine and antirabies serum). Contact the local health department for further guidance.

Wound closure

- Clean the wound with saline and antiseptics (povidone-iodine 10% solution or chlorhexidine gluconate 1.5%).
- Assess the need for debridement.
- Leave bite wounds open (unless severe bleeding needs management).
- If the cosmetic result of secondary repair is likely to be poor, refer for wound debridement and possible primary closure to a plastic surgeon.

Treating wound infections and antibiotic prophylaxis

- Treat infected bites with oral amoxicillin-clavulanate 25 mg/kg amoxicillin twice a day for 5–7 days.
- Give antibiotic prophylaxis (oral amoxicillin-clavulanate 25 mg/kg amoxicillin twice a day for 3 days only to children with:
  - Cat bite or human bite that has broken the skin and drawn blood
  - Damage to the bone, joint, tendon or vessels
  - Deep wound or with extensive tissue damage
  - Wound visibly contaminated.
- Consider antibiotic prophylaxis for children with animal or human bites in high-risk areas including hands, feet, face, genitals or in children with immunosuppression.

DO NOT give antibiotics to children with an animal or human bite that has not broken the skin.

Referral

Refer for surgery if:

- Animal bite is in a challenging area (border of lip, eyelid) or where scarring should be avoided, i.e. face.
- Suspected damage to underlying structures.

Follow-up

- Ask the caregivers to return after 2–3 days for follow-up or earlier if the child worsens.
- Look for wound infection and treat accordingly (p. 487).

6.23.4 Insect bites and stings

All insect bites may cause allergic reactions. Bee and wasp stings occasionally cause a severe anaphylactic reaction. Often the insect is unknown. For tick bites see p. 263; and for snake bites, venomous fish and jellyfish stings see p. 753.

Signs and symptoms

Assess ABCDE (p. 716), check for signs of anaphylaxis (p. 730, p.733) and if unstable manage immediately.

Inspect the bite or sting for:

- Redness and swelling around the bite or sting
- Itchiness, pain
- If severe allergic reaction, signs of anaphylaxis: difficulty in breathing, wheezing, stridor, urticaria, swelling of lips, tongue and face.

Treatment

- If a sting remains in the site, remove it.
- Advise to apply cool, wet towels or ice packs to reduce the pain and swelling.
- Consider corticosteroid cream (p. 842) for pain relief.
- If severe pain, give oral paracetamol or ibuprofen (p. 509).
- Consider anxiolytic medication, e.g. diazepam 0.2 mg/kg as a single oral dose or midazolam (see dosages in Annex 4).

▶ If itchiness, advise application of a moisturizing cream. If itchiness persists, give an oral antihistamine such as loratadine 5 mg once a day if ≤ 30 kg, 10 mg once a day if > 30 kg (see dosages in Annex 4).

6.23.5 Burns and scalds

A burn is a response of skin or subcutaneous tissue to thermal energy caused by heat, chemicals, electricity or radiation. A scald is caused by a hot liquid or vapour (70% of burns occur in children). Most minor burns in children under age 3 occur at home and are preventable (see p. 110 for counselling messages).

Examination

- First assess ABDCE (p. 716) and manage accordingly
- Assess area and depth of burns (p. 746)
- Consider child maltreatment (p. 637).

Referral

Refer urgently if:

- Partial-thickness burns > 10% of the total body surface area
- Full-thickness burns > 2% of the total body surface area
- Third-degree burns
- Burns involving face, hands, nipples, genitalia, joints
- Inhalation injury
- Circumferential extremity burns
- Burns presenting with other trauma
- High-voltage electrical burns, including lightning injury
- Suspected child abuse
- Signs of toxic shock syndrome (rare, serious complication of burns): rash with desquamation, red skin, fever and shock
- Suspected septicaemia (p. 734).

Treatment

▶ For management of severe or extended burns, see p. 745.

▶ Run cold water over the burned area for five minutes, or immerse area in tepid water.

Cleaning and dressing the wound

- Ensure adequate pain control before procedures (p. 510) such as changing dressings.
- If skin is intact, clean with antiseptic solution (e.g. chlorhexidine solution 0.25%) without breaking the skin.
- If skin is not intact, debride the burn: except for very small burns, debride all blisters, and excise adherent necrotic (dead) tissue over the first few days.
- Apply topical antibiotics ointments or cream, e.g. silver sulfadiazine.
- Dress the wound or leave burns that are small or in areas that are difficult to cover open to the air and keep them clean and dry.
- If there are signs of local infection (pus, foul odour or cellulitis), treat with oral amoxicillin 25 mg/kg twice a day and cloxacillin 15 mg/kg 4 times a day (see dosages in Annex 4).
- If you suspect infection beneath a crust, remove the crust.

Other considerations

- Check tetanus vaccination status. Give a booster tetanus vaccination and antitetanus serum, if indicated (p. 488).
- Give paracetamol or morphine depending on the pain severity (p. 508).
- Consider the need for anxiolytic medication, e.g. oral diazepam 0.2 mg/kg once or twice a day or midazolam (see dosages in Annex 4).
- Prevent burn contractures (burn scars across flexor surfaces) by passive mobilization of the involved areas and by splinting flexor surfaces to keep them extended. Splints can be made of plaster of Paris, and should be worn only at night.

Follow-up

- Clean and dress the wound daily and apply topical antibiotic ointments or cream (e.g. silver sulfadiazine).
- Begin physiotherapy and rehabilitation early, if indicated, and continue throughout the course of burn care.

6.23.6 Head injuries

Head injuries in children are common. Their severity can range from minor head trauma (alert and oriented child) to severe head trauma leading to death. Short-term drowsiness and vomiting once or twice are common problems.

History

- Mechanism and circumstances of injury
- Time of injury
- Loss of consciousness (description and duration)
- Ability to recollect events (amnesia) before and after injury
- Confusion, drowsiness
- Seizures post-injury
- Headache
- Vomiting.

Examination

Assess ABDCE (p. 716) and manage accordingly.

Perform a physical examination including a thorough neurological examination. Look for:

- Disability and level of consciousness: Alert; responds to Voice; responds to Pain; Unconscious (AVPU)
- Pupil reaction and eye movement (p. 439)
- Lacerations, bleeding and bruising on the scalp
- Skull fracture or deformity
- Other injuries.

RED FLAGS

Consider urgent referral to hospital if:

- Loss of consciousness or history of loss of consciousness > 1 min
- Seizure
- Pre- and post-traumatic amnesia
- Confusion or altered mental state
- Persistent vomiting
- Focal neurological signs
- Penetrating injury
- Injuries to the orbit and cornea
- Cuts to the lip or eyebrow
- Lip or teeth injuries including avulsion
- Bulging fontanelle
- Persistent somnolence during observation
- Suspicion of intentional injury
- Suspicion of depressed or base skull fracture
- Cerebrospinal fluid leak or bleeding from the nose or ears
- Nonwalking infant (if maltreatment is suspected).

Investigations

Skull X-ray is NOT routinely indicated in children with head trauma.

Treatment

- If minor head injuries (no red flags in history and physical examination):
  - — If no concerns and normal physical examination: observation and supportive care at home (Counselling box 38). Reassure the caregivers that most head injuries are mild and that their child's examination is normal.
  - — If any concern (e.g. children < 2 years with risk trauma mechanism, or children who have vomited once): observe at the health care facility for several hours.
- Counsel on pain management with paracetamol and ibuprofen (p. 508).
- Counsel the caregivers on how to provide supportive care at home and when to return urgently (Counselling box 38).

Counselling box 38. Home treatment of a child with a head injury

How to care for your child with a head injury at home

- Observe your child at home closely for the 24 hours following the head injury.
- Let your child sleep if desired. Wake the child every 4–6 hours.
- If your child has pain or headache, give paracetamol or ibuprofen as required.
- Return urgently to the health care facility or nearest hospital if your child presents any of the following:
  - More irritable than usual, drowsy or difficult to wake up
  - Vomiting more than once
  - Convulsion
  - Bleeding or any discharge from the ear or nose
  - Poor coordination or new arm or leg weakness
  - Unclear speech
  - Seeing double or pupils of different size
  - Significant change in behaviour
  - Severe or persistent headache that does not improve with paracetamol or ibuprofen.

6.23.7 Sprains

A sprain is a soft tissue injury, involving stretching or tearing of the supportive ligaments of a joint (ankle, wrist, knee). Inversion injuries of the ankle are common in adolescents who play a lot of sport.

History

- Mechanism of injury
- Location of injury, pain and swelling

Examination

Check active and passive mobility. Observe the child playing with toys and moving around the room to assess mobility.

Rule out a fracture (p. 498).

Look for signs of a sprain:

- Painful and swollen joint (ankle, wrist, knee)
- Possible bruising
- Inversion injury of the ankle: pain and swelling to the proximal base of the fifth metatarsal.

Treatment

Sprains in children usually heal quickly and require little follow-up.

- Early immobilization.
- RICE:
  - **R**est – assess the need for crutches if ankle or knee sprain. Prolonged immobilization (> 1 week) is not recommended
  - **I**ce – apply ice intermittently for 20 minutes every 4 hours to the affected site for the first 2–3 days
  - **C**ompress – with a bandage or tubular elastic bandage
  - **E**levate – as much as possible to reduce the swelling.
- Advise to avoid strenuous activity following the injury.
- Treat pain according to severity (p. 506).

Follow-up

Rehabilitation is important after the acute phase. Give mobility exercises or consider referring to physiotherapy.

6.23.8 Pulled elbow

Common in children aged 1–4 years. Pulled elbow (nursemaid's elbow) occurs when a child's hand is grabbed and pulled or subjected to a sudden jerk or when the child is being swung around while holding hands. This leads to the radial head slipping out of the annular ligament.

History and examination

- History of pulled elbow
- Arm is held down by the child's side in a slightly flexed position
- Only painful when moving the elbow.

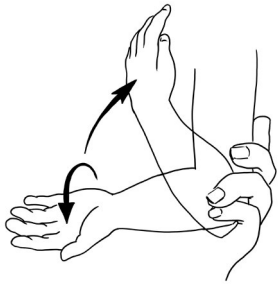
Investigations

If clear mechanism of injury, X-ray is not required.

Treatment

The radial head can be easily replaced with immediate effect. Carry out the manoeuvre with supination and slow flexion of the elbow:

- Apply pressure over the radial head
- Supinate the arm
- Flex the elbow with the arm supinated.



Supination/flexion manoeuvre for pulled elbow

6.23.9 Fractures

Before 16 years of age, 50% of boys and 25% of girls will sustain a fracture. Children's bones differ from adults', and are subject to child-specific fractures.

DO NOT miss child maltreatment. Assess whether the reported mechanism of injury is compatible with the injury (p. 638).

If significant force is involved (e.g. road traffic injury) assume major trauma until proven otherwise.

History

- Mechanism of injury
- Location of injury, pain and swelling.

Examination

Assess ABDCE (p. 716) and manage accordingly.

Determine range of movements:

- Assess joint movements above and below the site of injury (if pain allows)
- Allow active movements before attempting passive movements

- Observe the child moving around the room.

Assess whether tendons and bones (movement) and nerves (sensation) are intact. Look for:

- Swelling or bruising over a bone
- Deformity
- Pain in the injured area that gets worse during movement or when applying pressure
- Limited movement and loss of function in the injured area e.g. to bear weight in the affected foot, ankle or leg. In small children, the only finding may be loss of normal use of the limb
- Dislocation
- Skin changes
- Closed (skin intact) or open fracture (overlying skin wound)
- Wounds (distribution, depth).

Palpate for:

- Maximal point of tenderness (likely site of the fracture)
- An obvious breakage or misalignment
- Sensation
- Pulses, capillary refill.

Investigations

X-ray for all bone injuries.

Treatment and referral

- Remove rings from injured hands and fingers early in case of swelling.
- Elevate the limb, e.g. in a sling (p. 788), if there is any likelihood of swelling.
- Assess and manage pain (p. 506).
- Consider the need for anxiolytic medication, such as diazepam 0.2 mg/kg single dose or midazolam (see dosages in Annex 4).
- Further specific management depends on type of fracture. See sections below.
- Rehabilitation is important: consider referral to physiotherapy.

Distal radial fractures

One of the most common fractures in children and adolescents.

- History of a fall on outstretched hand
- May present as subtle swelling or severe deformity of the limb.
- ▶ Simple fractures require a splint and orthopaedic follow-up.
- ▶ If there are signs of displacement or angulation, **refer urgently to orthopaedic or trauma surgeon**.

Torus fracture (buckle fracture)

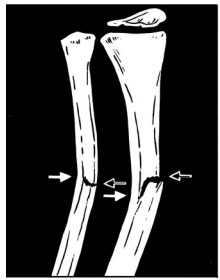
Cortex of the bone buckles with no apparent break.

- History of a fall on outstretched hand
- Minimal deformity
- Swelling and tenderness at point of fracture.
- ▶ Immobilization (cast or splint) for 4–6 weeks.

Greenstick fracture

Cortical surface breaks on one side, while the opposite side buckles.

- Pain, swelling and tenderness
- Deformity (bending or twisting) of affected limb.
- ▶ Immobilization (cast or splint) for 4–6 weeks.



Greenstick fracture

Epiphyseal fractures

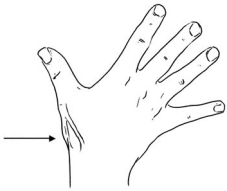
The epiphyseal (growth) plate can become weak and prone to fractures in mid-childhood.

- Pain and tenderness on pressure on the growth plate
- Inability to move or put weight on affected limb.
- ▶ Refer to orthopaedic or trauma surgeon.

Scaphoid fracture

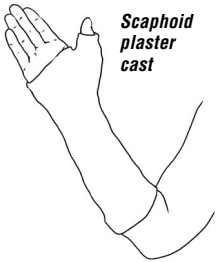
May occur once scaphoid bone is calcified (age > 9). **If missed**, there is a risk of non-union and avascular necrosis.

- Tenderness in the anatomical snuffbox
- Wrist pain when compressing the thumb
- Pain during passive radial and ulnar deviation of the wrist.



Anatomical snuffbox

- ▶ Refer for X-ray: scaphoid fractures may not be visible within 14 days of injury.
- ▶ If suspected fracture, place a scaphoid plaster cast or refer to an orthopaedic surgeon.



Scaphoid plaster cast

Toddler's fracture

Distinct type of tibia shaft fracture.

- Children < 2 years learning to walk
- Often no history of trauma
- Can present with refusal to bear weight.

- ▶ Immobilization in a long-leg cast with a bent knee for 3 weeks, then 2 weeks in short-leg walking cast.
- ▶ Consider child maltreatment (p. 637): bruises, swelling, other signs of trauma.

Fracture of hands and fingers

Children or adolescents may fracture their fingers after a fall on an outstretched hand during sports activities. Fractures of the metatarsal shaft of the fifth finger may be caused by a fist fight.

- History of a fall on outstretched hand, fist fight or injury during sport activity
- Deformity, swelling of hands or fingers
- Fracture of metatarsal shaft: depressed fifth knuckle when examining the semi-closed hand.

- ▶ Simple hairline fractures of fingers and no bony displacement: manage with buddy strapping (p. 787), advise rest and hand elevation.

Fracture of feet and toes

Adolescents who play a lot of sport may develop stress fractures of the foot metatarsals. Toe fractures also occur commonly in children. The great toe is most frequently involved.

Rule out inversion injury (sprain) of the ankle (p. 496).

▶ Simple hairline fractures of toes II–IV with no bony displacement: manage with buddy strapping (p. 787), advise rest and foot elevation.

6.24 Foreign bodies

6.24.1 Foreign body in ear, nose or soft tissues

Foreign body in the ear (external auditory canal)

History and examination

■ Pain, discharge, decreased hearing in one ear.

Treatment and referral

▶ Remove the foreign body or refer to hospital if too deep in the canal.

Foreign body in the nose

History and examination

■ History of witnessed insertion

■ Unilateral, foul-smelling discharge or bleeding from nose (if longer ago).

Treatment

▶ Remove, if foreign body is easily visible, by:

- Positive pressure (for foreign bodies that fully occlude the nostril):
  - — In older children, ask the child to blow their nose with the unaffected nostril occluded and mouth closed.
  - — In young children, ask the caregiver to:
    1. Sit their child sideways on their lap with the affected nostril against their chest
    2. Occlude the unaffected nostril with a finger
    3. Seal their mouth over the child's mouth and blow a short, sharp puff of air into the child's mouth (the force of the air through the nasopharynx forces the foreign body down and out of the nostril).

- Forceps (fine or alligator), tweezers (if you can grasp it) or a partially unravelled paper clip (if you can get the wire loop behind the foreign body), usually for foreign bodies that do not occlude the nostril.
- Suction.

Referral

- Refer if unsuccessful removal, or when foreign body is not visible.
- Refer urgently if button batteries and magnets lodged against the nasal septum for urgent removal.
- Refer other intranasal foreign bodies for removal as an elective procedure.

Foreign body in soft tissues

History and examination

■ May be present in a child with a soft tissue injury.

Treatment and referral

▶ Remove if the foreign body is easily visible. Prior to removal, ensure foreign body is not located near critical structure (major vessels, nerves).

▶ Refer if deep penetration, complicated removal or foreign body is not visible.

6.24.2 Foreign body in throat and airway

! For choking child: see p. 716

Foreign body in throat

History and examination

■ History of ingesting something sharp (e.g. bone)

■ Feeling of something stuck in throat.

Treatment and referral

▶ Be aware of CHOKING. Assess ABCDE (p. 716) and manage accordingly.

▶ If stable, examine throat (if necessary, use lidocaine spray or tongue depressor for better visualization).

- If the object is visible, use Tilley forceps for removal.
- If the object is not visible or removal complicated, refer to a specialist.

Foreign body in upper airway (larynx)

Foreign bodies in the upper airway can range from peanuts and beads to larger objects. They tend to occur in pre-school children.

History and examination

- History of sudden onset of cough
- Visible on the median line
- Stridor
- Gagging
- Choking
- Child becomes suddenly quiet.

Treatment and referral

- Be aware of CHOKING. Assess ABCDE (p. 716) and manage accordingly.
- If no choking but clinical signs present (e.g. stridor): refer urgently for laryngoscopy or bronchoscopy.

Foreign body in lower airway

Most aspirated foreign bodies reach the bronchi, usually in the right hemithorax.

History and examination

- History of sudden onset of cough, gagging, choking
- Breathing difficulty, chest indrawing
- Focalized wheezing or reduced air entry on lung auscultation.

Also consider foreign body aspiration in children with:

- Several weeks of cough (p. 171), wheezing (p. 191) or pneumonia (p. 184) not improving with usual management, empyema.

Treatment and referral

- Assess ABCDE (p. 716) and manage accordingly.
- Refer for further investigations and management (bronchoscopy).

6.24.3 Swallowed foreign body

History and examination

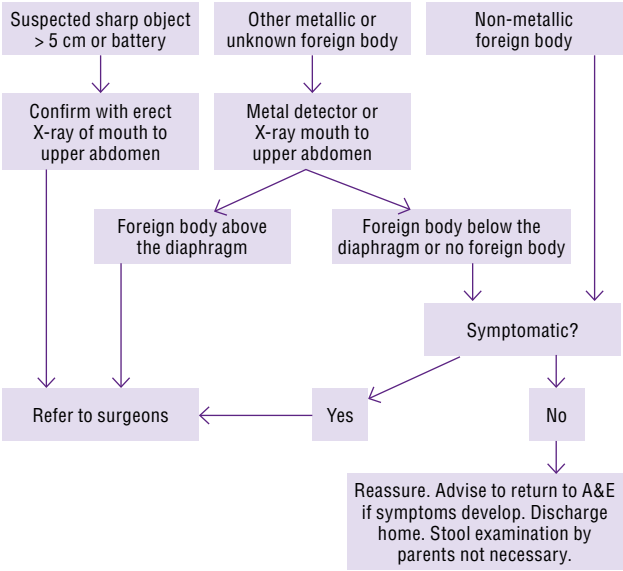
- History of swallowed object
- If stuck in the oesophagus: salivation, pain and difficulty in swallowing.

Treatment and referral

Most swallowed foreign bodies will pass through the gastrointestinal tract and will be eliminated in the stool (usually within 24–48 hours).

- Do not give laxative or natural remedies, as they may be harmful.
- Follow algorithm below for management of swallowed foreign bodies.
- For swallowed button battery, see p. 506.

Management algorithm for swallowed foreign bodies



Button batteries

Button batteries (small, flat batteries used in watches and other electronics) are very dangerous in small children. Their ingestion can lead to life-threatening complications. A battery stuck in the oesophagus can cause severe burns in as little as 2 hours.

Investigations

- **Urgent** X-ray to determine the location of the button battery.

Treatment and referral

- In asymptomatic children with early diagnosis (≤ 12 hours after ingestion) and battery positioned beyond the oesophagus, ask the caregivers to check whether the battery is passed in the stool. Repeat X-ray after 7–14 days. Refer to hospital if not yet evacuated.
- Refer urgently to hospital if:
  - Unable to perform X-ray
  - Battery is impacted in the oesophagus for immediate endoscopic removal (preferably < 2 hours)
  - Diagnosis is delayed (> 12 hours since swallowing), even if the battery has passed the oesophagus: further investigation is required (endoscopy, CT) to rule out oesophageal damage and vascular injury, even in asymptomatic children.

6.25 Pain

Pain is the unpleasant sensory and emotional experience associated with actual or potential tissue damage. It is essential to know how to assess and manage pain in the following situations:

- Acute pain in emergency situations (e.g. extensive burns) or in conditions requiring urgent referral (e.g. testicular torsion)
- Acute pain (pain lasting < 3 months) associated with a medical condition, e.g. acute otitis media
- Chronic pain (pain that persists or recurs for > 3 months)
- Pain control in children with long-term needs, e.g. sickle cell disease
- Pain at the end of life (see Palliative care, p. 655)
- Pain control for procedures (p. 510).

Assessment

Assess pain to identify its nature, severity and response to management. Non-verbal clues for pain in a young child are:

- Increased clinging
- Unusual quietness
- Restlessness
- Whimpering
- Sobbing
- Lying "scared stiff"
- Lethargy
- Irritability, inability to be consoled
- Unusual posture
- Reluctance to move
- Screaming
- Aggressiveness.

Characteristics of the pain:

- Site (localization)
- Radiation (spreading)
- Severity (use an appropriate pain scale, p. 508)
- Onset
- Character: sharp, stabbing, dull, burning
- Duration, frequency
- Aggravating and relieving factors
- Concerns about the pain and how it affects the child.

Effect of pain on vital signs:

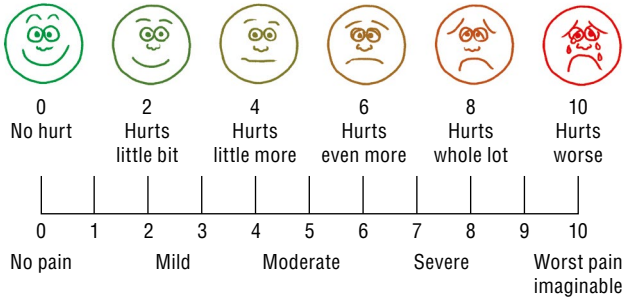
- Heart rate increases
- Respiratory rate can increase or decrease
- Blood pressure rises during acute bouts of pain
- Oxygen saturation falls during acute bouts of pain.

In children and adolescents with chronic pain:

- Impact of pain on their daily life, such as participation in or absence from school, sports, other activities and social relationships.

Pain measurement scale

Use a validated paediatric pain score to determine whether the pain is mild or moderate-to-severe, such as a **facial scale** or a **pain ladder** scored from 0 (none) to 10 (worst ever).



Management of pain

The aim is to reduce, control and prevent pain in all situations. If not controlled, pain will dominate the life of the child and family.

Pain can usually be managed with analgesics such as paracetamol or ibuprofen; immobilization if needed; and distraction, comfort and reassurance from the parent or caregiver.

- Treat the underlying source of pain when possible.
- Give analgesics regularly ("by the clock"), so that the child does not have to experience the recurrence of severe pain.
- Administer by the most appropriate, simple, effective and least painful route: by mouth when possible. Avoid injections and infusions if possible, as these can be painful and the effect of IM treatment may be delayed.
- Tailor the dose to each child's individual needs, and progressively titrate the dose to ensure adequate pain relief (especially with morphine). Breakthrough pain needs medication top-ups and may fluctuate.
- Teach the caregiver how to give pain medicines.
- Reassess the need and effectiveness of interventions for pain management every 2–3 days based on changes in the pain level.
- Prevent, recognize and treat the side-effects of analgesic drugs, e.g. constipation, pruritus, dizziness, nausea.

Analgesics based on pain severity

Give analgesics in two steps according to whether the pain is mild or moderate-to-severe using the following drugs:

Mild pain (0–3)

- For children > 3 months who can take oral medication, give paracetamol at 10–15 mg/kg every 4–6 h or a nonsteroidal anti-inflammatory drug such as ibuprofen at 5–10 mg/kg every 6–8 h.
- For infants ≤ 3 months, use paracetamol only.

DO NOT give aspirin (acetylsalicyclic acid) to children under 16 years of age due to the risk of Reye syndrome.

Moderate (4–6) to severe (7–10) pain and pain that does not respond to the above treatment:

- Stronger analgesics may be used as available in your local setting.
- Give morphine orally or IV every 4–6 h or by continuous IV infusion. Calculate the **exact** dose based on the child's body weight. For dosages see Annex 4. Once the pain is controlled with morphine, the effective dose can be given with slow-release oral morphine.
- If tolerance to morphine develops, increase the dose to maintain the same degree of pain relief.
  - — If morphine treatment is continued for more than 2 days, give a laxative (p. 316)
  - — If morphine is used for chronic pain, be aware of morphine dependence.

! Morphine can cause respiratory depression – monitor carefully.

Adjuvant medicines

Commonly used drugs to help with pain relief, given alone or combined with the above-mentioned analgesics, include:

- Diazepam for muscle spasm
- Carbamazepine for neuralgic pain
- Corticosteroids (such as dexamethasone) for pain due to an inflammatory swelling pressing on a nerve.

Nonpharmacological methods

Nonpharmacological methods are useful to minimize the pain and reduce stress and anxiety.

- Advise caregivers on methods for reducing pain and associated stress and anxiety at home (Counselling box 39).
- In children with chronic pain, psychological management through cognitive behavioural therapy and related interventions (acceptance and commitment therapy, behavioural therapy and relaxation therapy) may be used.

Referral

- When pain is not controlled despite 2-step standard analgesia, refer to a pain specialist.
- For children with chronic pain or pain that is difficult to control, consider referral to specialists; e.g. for palliative care and psychosocial support.

Pain control for procedures

For painful lesions on the skin or mucosa or during painful procedures, use one of the following local anaesthetics (p. 840):

Counselling box 39. Managing pain at home

How to manage your child's pain at home

- Do not leave your child in pain alone.
- Listen to your child and show that his or her needs are important.
- Provide a familiar and homely environment, and do not separate your child from his or her favourite things, e.g. cuddly toy.
- Make the child's surroundings comfortable (e.g. reduce noise).
- Touch, cuddle, carry, breastfeed, hold or massage your child.
- Apply hot or cold compresses to the immediate site of the pain (e.g. a damp cloth).
- A breeze or fan often eases pain.
- Never force your child to eat. Small healthy snacks will help.
- Distract your child, for example with play, music or stories.

- Lidocaine, prilocaine: apply on intact skin prior to the painful procedure.
- Lidocaine, epinephrine (adrenaline), tetracaine (LAT): apply to a gauze pad and place over open wounds; particularly useful during suturing. Use with caution in young infants because of potential systemic absorption (apply no longer than 20 minutes).
- Local infiltration with lidocaine 3 mg/kg or bupivacaine 0.5–2.5 mg/kg.

In newborns and infants:

- Offer breastfeeding, non-nutritive sucking or sucrose during painful procedures such as immunization or drawing blood.
- For sucrose, give 0.5 mL of 24% sucrose solution, orally or on the tongue through sucking, 2 minutes prior to the procedure. Use the minimum volume needed for pain relief, and repeat doses as needed up to 2 mL per procedure.

6.26 Weight and growth problems

Parents often come with concerns regarding their child's growth, weight or eating behaviours. They may be concerned that their child is too thin (p. 512), overweight (p. 517), too short (p. 520), too tall (p. 522) or has delayed or early pubertal development (p. 673).

Growth evaluation

Weigh and measure the weight and height or length of the child (p. 21) and assess the different nutritional parameters (weight-for-height/length, height/length-for-age, body mass index (BMI)-for-age) to classify the nutritional status according to the child's age (Tables 82 and 83). Consult WHO child growth standards (Annex 3). Weight and height monitoring are part of every well-child visit (see Chapter 3).

Table 82. Classification of nutritional status in children < 5 years

Comparison with WHO Child Growth Standards	Weight-for-height/ length or BMI-for-age	Height/length-for-age
> + 3 SD	Obesity	–
> + 2 SD	Overweight	–
≥ - 2 SD and ≤ + 2 SD	Normal	Normal
< - 2 SD and ≥ - 3 SD	Moderate acute malnutrition (moderate wasting)	Moderate chronic malnutrition (moderate stunting)
< - 3 SD	Severe acute malnutrition (severe wasting)	Severe chronic malnutrition (severe stunting)

Table 83. Classification of nutritional status in children ≥ 5 years

Comparison with WHO Child Growth Standards	BMI-for-age in children
> + 2 SD	Obesity
> + 1 SD	Overweight
≥ - 2 SD and ≤ + 1 SD	Normal
< - 2 SD and ≥ - 3 SD	Thinness
< - 3 SD	Severe thinness

Note that standard deviation (SD) and z-score have the same meaning.

6.26.1 Malnutrition, thinness and growth faltering

In children < 5 years:

- **Moderate malnutrition** is defined as weight-for-length/height or BMI-for-age between < -2 SD and ≥ -3 SD
- **Severe malnutrition** is defined as weight-for-length/height or BMI-for-age < - 3SD
- Consider measuring the mid-upper arm circumference (MUAC) to identify young children with severe or moderate acute malnutrition, particularly in children with oedema.

In children ≥ 5 years:

- **Thinness** is defined as BMI-for-age between < -2 SD and ≥ -3 SD
- **Severe thinness** is defined as BMI-for-age < -3 SD
- **Growth faltering** is characterized by a slower rate of weight or height gain than expected for age and sex. The child's growth when plotted on the growth chart will deviate below the expected trajectories of the growth line over time. Growth faltering may be due to a sequence of acute illnesses or the onset of a nutritional problem.

History

Newborns and infants

- Factors that may be associated with growth faltering:
  - Preterm birth
  - Other congenital problems or perinatal illness
  - Neurodevelopmental concerns
  - History of maternal postnatal depression and anxiety
  - Recurrent infections
- Feeding or eating history:
  - Breastfeeding or infant formula feeding
  - Frequency and amount of consumed milk or formula
  - If formula-milk fed: type of formula and preparation of milk (dilution)
  - Complementary feeding, type of complementary food

Exclusive breastfeeding is recommended in the first 6 months of age. From 6 months onwards all infants should start receiving complementary foods in addition to breast milk (p. 89).

- Factors contributing to insufficient weight gain or weight loss in infants:
  - Ineffective suckling in breastfed infants
  - Ineffective bottle feeding
  - Inappropriate feeding patterns or routines used
  - Unfavourable feeding environment
  - Feeding aversion
  - Unfavourable parent–infant interactions

- — Insufficient response of caregivers to infant's feeding cues
- — Physical conditions affecting feeding.

Toddlers and children

- Feeding/eating history: number of meals per day, timing of meals (breakfast, lunch and dinner), components of meals
- History of diarrhoea
- History of frequent cough or airway infections
- Living environment, social and family situation

  Note: A difficult family situation or exposure to maltreatment can influence eating and weight gain
- Contributing factors to insufficient weight gain or weight loss:
  - — Mealtime practices
  - — Types of food offered
  - — Food aversion and avoidance
  - — Difficult parent–child interactions
  - — Insufficient response of caregivers to child's mealtime cues
  - — Lack of appetite
  - — Physical conditions affecting feeding
- Parents' diet (vegan, vegetarian).

Adolescents

- Eating history (as above)
- Living environment, social and family situation
- Known diseases, medications
- Signs of eating disorders (p. 552):
  - — Distorted body image and fear of gaining weight
  - — Weight control measures, e.g. self-induced vomiting, dieting, use of laxatives, diuretics or other medications, fasting or excessive exercise.

Examination

Look for:

- Visible severe wasting:

  - — Muscle mass loss: clavicle protrusion, prominent shoulder bones, noticeable knee bones
  - — Fat mass loss: flat facial cheeks, depressions between the ribs, flat or baggy buttocks
- Oedema
- Skin changes such as “flaky paint”.

In newborns and infants observe:

- Breastfeeding technique and position of infant (p. 85)
- Preparation of the formula in formula-fed infants: correct measurement and preparation (p. 91)
- Parent–child interaction.

Differential diagnosis

Look for underlying conditions, including:

- Coeliac disease (p. 296), inflammatory bowel disease, congenital or acquired heart disease (p. 584), cystic fibrosis (p. 598), HIV (p. 623), cancer (p. 618), tumours, hyperthyroidism, physical problems affecting feeding, tuberculosis (p. 631).
- In addition, in newborns and infants: urinary tract infection (p. 356), cow’s milk allergy (p. 293) or other food allergies.
- In addition, in adolescents: eating disorders (p. 552).

Investigations

- In newborns and infants, investigations for urinary tract infection (p. 357): unrecognized urinary tract infection can cause loss of appetite.
- If the diet includes gluten-containing foods, investigations for coeliac disease (p. 296).
- Further investigations only if indicated by the clinical findings.

Treatment

Children with moderate malnutrition or growth faltering and no other medical conditions do not require immediate hospital admission. However, they require regular follow-up.

- Treat the underlying medical condition if any.
- Explain and discuss interventions with both caregivers and the child as appropriate for the child’s developmental stage.

- Counsel on feeding and nutrition based on the problems identified and the child's age (p. 81).
- Encourage and support the mother to continue breastfeeding, and counsel on overcoming difficulties (p. 84).
- Establish a management plan with specific goals including:
  - Interventions, e.g. correction of breastfeeding technique, introduction of complementary feeding, regular meals if previously skipped
  - Follow-up appointments for reassessment including physical examination and growth monitoring to review progress and achievement of goals.
- Advise, if appropriate, the child's parents or caregiver:
  - Encourage relaxed and enjoyable feeding and mealtimes
  - Eat together as a family or with other children
  - Allow young children to eat by themselves and be "messy" with their food
  - Make sure that feeds and mealtimes are not too brief or too long
  - Set reasonable boundaries for mealtime behaviour and avoid punishment
  - Avoid coercive feeding
  - Establish regular eating schedules, e.g. 3 meals and 2 healthy snacks in a day.
- Advise on food choices for infants and children that optimize energy and nutrient density and are appropriate for the child's developmental stage in terms of quantity, type and texture.
- Refer for food aid or social support if there is a problem with food availability.
- If a child develops new clinical symptoms or signs after the initial assessment, reconsider if further investigations are needed.

Referral

Consider referring if:

- Suspicion of underlying medical condition for diagnosis and initiation of management
- Severe thinness

- Marked weight loss
- No improvement after feeding support or eating management strategies
- Eating disorders in adolescents (p. 552).

Refer immediately all children with severe acute malnutrition. Before referral:

- Give a feed or 10% glucose or a sucrose solution to prevent low blood sugar.
- Keep the child warm.
- Consider giving the first dose of IV or IM antibiotics if referral is expected to be significantly delayed. Seek advice from the referral centre.

Follow-up

Follow-up will depend on the underlying condition. Diseases such as coeliac disease or cystic fibrosis will need a specialist treatment plan which can be implemented and monitored by the primary health care provider.

If an underlying condition is ruled out, follow up in a few weeks depending on the degree of concern.

6.26.2 Overweight and obesity

In children < 5 years: **overweight** and **obesity** are defined as weight-for-length/height or BMI-for-age > 2 SD and > 3 SD, respectively.

In children ≥ 5 years: **overweight** and **obesity** are defined as BMI-for-age > 2 SD and > 3 SD, respectively.

Overweight and obese children are an increasing problem for primary health care professionals to manage. Overweight and obesity are most often due to poor diet and eating habits such as excessive intake of hypercaloric foods and lack of physical exercise. It is usually not necessary to perform detailed endocrinological investigations unless other symptoms suggest such a cause.

History

- Dietary history: portion size, eating habits and composition (junk food), juices and sugary drinks
- Physical activity
- Screen time (p. 103)
- Family history of obesity, type 2 diabetes, maternal gestational diabetes
- Psychological factors: personal, parental and family stress

- Prolonged use of corticosteroids
- Symptoms of causes and complications of obesity:
  - Headache (hypertension (p. 342) and pseudotumour cerebri)
  - Snoring, breathing pauses during sleep and daytime somnolence (see Obstructive sleep apnoea, p. 551)
  - Joint symptoms, e.g. hip pain in slipped upper femoral epiphysis (p. 421)
  - Bullying
  - Depression (p. 526), low self-esteem and eating disorders including binge-eating (p. 552), substance abuse (p. 649) in adolescents
  - Irregular menses or hirsutism (polycystic ovary disease)
  - Polyuria or polydipsia (see Diabetes, p. 601)
  - Abdominal pain (cholelithiasis).

Examination

Perform a complete physical examination (p. 12). Depending on age and degree of overweight or obesity, look for:

- Hypertension
- Pubertal stage (p. 673)
- Acanthosis nigricans: areas of dark, velvety, thickened skin discoloration in skin folds (axilla, back of neck, groin)
- Signs of underlying endocrine conditions such as Cushing syndrome: central obesity and excess weight gain especially in the face ("moon face"), neck and between the shoulders ("buffalo hump"), easy bruising and pink stretch marks.

Investigations

- Urinalysis (p. 357) for protein and glucose to check for diabetes
- Consider blood test with blood sugar, lipid profile and ultrasound of liver to assess for fatty liver
- Consider referral to the specialist for further investigations if the cause appears to be more than diet and lifestyle or if there are additional comorbidities, including acanthosis nigricans.

Treatment

- Counsel on lifestyle modification:
  - Healthy diet (p. 81)
  - Physical activity (p. 103)
  - Limiting screen time (p. 103)
  - Enough sleep (p. 102) and healthy sleep practices (p. 549)
  - Involvement with community activities, school activities, mentors, sporting groups.

Set realistic goals: reduce junk food, swap for "healthier" choices, no weight gain instead of weight loss, increase physical activity.

- Involve the entire family in lifestyle changes and encourage a healthy environment at home:
  - Encourage family meals and preparation of healthy snacks for kindergarten and school (avoid giving money to buy junk food and sugary drinks)
  - Food should not be used as treats or rewards, or meals withdrawn as punishment
  - Encourage family activities such as walking and sports.

In adolescents, additionally:

- Use motivational interviewing (p. 670) to promote changes in physical activity and diet, e.g. discuss the issue of meals taken outside the family, either with peers or when seeing friends or dating.
- For depression (p. 526) or binge-eating (p. 555), refer for psychosocial support.

Referral

Refer for specialist or inpatient care when comprehensive lifestyle interventions (diet, exercise) fail or in the presence of severe comorbidities.

Consider referral for provision of psychological support, and to a nutritionist for nutritional counselling.

6.26.3 Short stature

Parents may complain that the child is too short, or short stature and stunting may be identified at child health check-ups.

Short stature or stunting is defined as length/height-for-age < -2 SD.

Most causes of short stature are due to normal variation, including the constitutional delay of growth and development (Table 84).

Rarely, a short stature is due to an underlying medical condition.

Growth evaluation

- Assess the growth curve to establish whether the child has always been short or if there has been a recent delay in the growth velocity (growth rate assessment).
- Assess the height of both parents and siblings if any, and calculate the genetic or target height, in cm:
  - Girl: ([height of mother + height of father]/2) – 6.5
  - Boy: ([height of mother + height of father]/2) + 6.5

History

Depending on the age of the child or adolescent at presentation:

- Birth history: short for gestational age or prematurity
- Perinatal history (includes infections or exposure to toxins during pregnancy)
- Genetic diseases, syndromes
- Dietary intake: chronic poor food intake can cause stunting
- Family history, social history
- Medical history: recurrent infections, neurological, gastrointestinal diseases
- Intake of medications.

Examination

Look for:

- Dysmorphic features, e.g. webbed neck, broad chest, hypertelorism, ears posterior and rotated
- Delayed puberty (see Puberty assessment, p. 673)
- Child development (p. 61).

Investigations

Depending on suspected reason:

- X-ray of left hand and wrist for bone age (needs expert interpretation)
- Urine testing for protein and glucose
- Full blood count and film including ESR or CRP, glucose, urea, creatinine, electrolytes, thyroid stimulating hormone, free T4, coeliac disease antibodies, in girls, karyotype assessment
- Sweat test
- Genetic testing for syndromes associated with short stature.

Differential diagnosis

Differentiate between idiopathic short stature and normal variants (Table 84) and short stature due to an underlying medical condition.

Idiopathic short stature and normal variants are both associated with:

- History of similar growth pattern in either parent
- Proportionate short stature

Table 84. Characteristics of idiopathic short stature and normal variants

Diagnosis	In favour
Idiopathic short stature	• Short but steady growth • Normal target height • No puberty delay • Normal bone age.
Familial short stature	• Short but steady growth • Final height is appropriate with short target height • Puberty usually not delayed • Normal bone age.
Constitutional delay of growth and development	• More common in boys • Growth deceleration during the first 2 years, then normal velocity, with an acceleration in late adolescence (late bloomer) • Final height appropriate for target height • Frequently associated with puberty delay • Delayed bone age.

- No associated signs and symptoms
- Normal examination.

Rarely, a short stature is due to an underlying medical condition:

- Chronic poor food intake
- Genetic cause: Turner syndrome, Noonan syndrome, Prader-Willi syndrome
- Chronic disease: congenital or acquired heart disease, severe asthma, cystic fibrosis, coeliac disease, inflammatory bowel disease, chronic kidney failure
- Endocrine cause: growth hormone deficiency, hypothyroidism
- Musculoskeletal cause: skeletal dysplasias such as achondroplasia
- Psychosocial deprivation and child maltreatment (p. 637).

Management and referral

Parents may complain that the child is too short but if length/height and growth are appropriate and there are no additional signs and symptoms, no further action is needed other than to reassure the child and family.

Refer all children with:

- Unknown cause of short stature for further investigation
- Concerning findings during investigations.

Follow-up

Follow-up will depend on the underlying condition. If an underlying condition is ruled out, follow up in 3 months. Specific diseases e.g. coeliac disease will need treatment according to a specific management plan, which if followed should allow some catch-up growth.

6.26.4 Tall stature

This is an uncommon parental complaint but tall stature may be identified at child health check-ups. Tall stature is defined as a height > 2 SD above the mean for age (> 97th percentile).

Common causes of tall stature include familial tall stature, obesity, Klinefelter syndrome, Marfan syndrome and precocious puberty.

Evaluation for underlying medical conditions is guided by history and physical examination findings.

Growth evaluation

Assess the growth curve to establish whether the child has always been tall or if there has been a recent growth spurt.

Assess height of both parents (genetic or target height).

Examination

Look for signs of:

- Congenital syndrome (dysmorphic features)
- Precocious puberty (see Puberty assessment p. 673)
- Hyperthyroidism.

Referral

Refer to a specialist all children with concerning findings.

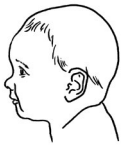
6.27 Head size variations

6.27.1 Microcephaly

Microcephaly is defined as a head circumference that is significantly smaller (< -2 SD or < 3rd percentile) than that of children of the same gender, age and ethnicity. The baby may be born with a small head (congenital) or the head may stop growing after birth (acquired).

Microcephaly can have many causes, including:

- Infections during pregnancy (toxoplasma, Zika virus, rubella, varicella, cytomegalovirus, syphilis)
- Exposure to toxic substances during pregnancy (alcohol and substance abuse, smoking, certain toxins and drugs)
- Genetic, e.g. Down syndrome (p. 573)
- Neurometabolic disorders
- Severe malnutrition during fetal life
- Injuries to the developing brain (hypoxia-ischaemia, trauma).



Normal head circumference

Microcephaly: *head circumference < -2 SD or < 3rd percentile*

Growth evaluation

Assess the growth pattern of the head by plotting previous measurements on the head circumference chart. See p. 21 on how to measure head circumference.

History and examination

Some children with microcephaly will develop entirely well with no other symptoms. Others depending on the underlying cause may have additional symptoms and problems, including:

- Epilepsy (40% of cases)
- Poor weight gain, short stature
- Vision and hearing problems
- Speech delay, learning problems
- Facial features.

Referral and follow-up

- Refer children with microcephaly and children with no increase in head circumference over 3 months for assessment by a specialist.
- Provide counselling and support and ensure promotion of early childhood development (p. 66) and early interventions with stimulation and play programmes when needed.

6.27.2 Macrocephaly

Macrocephaly is defined as a head circumference that is significantly greater (> 2 SD or > 97th percentile) than that of children of the same gender, age and ethnicity.

Macrocephaly may be a normal variation and harmless but can also have causes that require treatment:

- Familial macrocephaly: child born with a large head and normal body size, normal physical examination, no other symptoms
- Other genetic conditions including achondroplasia
- Metabolic disorders
- Hydrocephalus (increase of the cerebrospinal fluid)
- Cyst, abscess, tumour in the brain
- Perinatal infections (toxoplasmosis, rubella, syphilis, cytomegalovirus).

Growth evaluation

Assess growth pattern of the head by plotting previous measurements on the head circumference chart. See p. 21 on how to measure head circumference. Assess children with single measurements above 2SD or 97th percentile, and with progressive enlargement of the head across consecutive measurements, e.g. an increase from -1SD to 1SD in the growth chart lines (p. 816).

History

- History of trauma
- History of meningitis or encephalitis
- History of seizures
- Prematurity with history of intraventricular haemorrhage
- Family history of neurological or cutaneous diseases
- Developmental difficulties
- Known syndrome.

Examination

Perform a physical examination including a complete neurological examination. Look for:

- Delayed closure of the fontanelles (p. 128)
- Signs of raised intracranial pressure: tense and bulging fontanelle, nausea, vomiting, double vision, ataxia
- Signs of meningitis: fever, neck stiffness (p. 235)
- Syndromic features.

Management

For children with head growth parallel to the growth chart lines, no other symptoms and a likely diagnosis of familial macrocephaly, reassure the parents and continue growth monitoring. Referral is not necessary.

Referral

Refer urgently if the child has any sign of raised intracranial pressure, head trauma or meningitis.

Refer to a specialist for further assessment all children with:

- Rapid increase in head circumference

- Macrocephaly with other signs and symptoms
- Syndromic features for genetic testing.

6.28 Low mood and depression

Depressive mood in children and adolescents is common. Depression is often not a complaint of the child or adolescent but is reported by others.

Episodes of low mood are common during adolescence; most are not pathological but an emotional response to everyday life challenges and do not require a health care intervention. Conduct a careful assessment and differentiate depression from mood fluctuations and short-lived emotional responses to challenges in everyday life. Episodes of depression, especially when they are lasting and severe, can interfere with personal, family, social, educational or occupational life.

Major depression can lead to thoughts about suicide or plans for suicide (p. 530).

History

Small children tend to show symptoms of irritability, temper outbursts and aggressiveness. In adolescents, symptoms are often more like those of adults. In most cases, children or adolescents do not consult for sadness but rather suffer from symptoms suggesting or translating depression, such as feeling tired, headache, abdominal and muscle pain.

The core symptoms of depression are, for at least 2 weeks:

- Feeling sad, irritable or “down”
- Loss of interest or enjoyment in activities.

In addition, several of the following symptoms for at least 2 weeks:

- Disturbed sleep or sleeping too much
- Significant change in appetite or weight (decrease or increase)
- Growth faltering in children
- Beliefs of worthlessness or excessive guilt, low self-image and -esteem
- Fatigue or loss of energy
- Reduced concentration
- Indecisiveness
- Observable agitation or physical restlessness

- Feelings of helplessness or hopelessness
- Violence, self-harm, suicidal thoughts or actions
- Recurrent unexplained physical symptoms.

In older children and adolescents, ask the following questions to explore low mood and depression:

- Do you often feel down, depressed, or hopeless?
- Do you have little interest, energy or pleasure in doing things?
- Do you have trouble falling or staying asleep?
- Do you feel bad about yourself?
- Do you have poor appetite or overeat, or do you hurt yourself or others?
- Do you have thoughts that you would be better off dead?

- History of:
  - Similar problems
  - Psychiatric hospitalizations
  - Medications prescribed for mental, neurological or substance abuse problems
  - Suicide attempts.
- Family history of depression, substance abuse or suicide
- Psychosocial history:
  - Difficulty with daily functioning at home, school and in relationships
  - Stressors and triggering event, e.g. family disharmony, parental separation, domestic violence, being bullied, loss of a family member, friend, pet or romantic relationship
  - Coping methods and social support (family, school, community services)
  - Relationship with parents or caregivers
  - Situation at home, living conditions, household structure.

Check the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) for specific diagnostic criteria.

Examination

- Depending on findings of the history, perform a targeted physical examination
- Rule out any physical conditions that can resemble or exacerbate depression (see differential diagnosis below)
- Observe appearance, behaviour, mood and affect
- Assess content of thought (what the patient is thinking about) such as suicidal thoughts, phobias, hallucinations, delusions, obsessions.

Differential diagnosis

Assess if there is another explanation for the symptoms:

- Normal reaction to any triggering event or stressor
- Child maltreatment (p. 637)
- Physical conditions that can resemble or exacerbate depression such as anaemia (p. 406), malnutrition (p. 512), hypothyroidism, obesity (p. 517), medication side-effects (corticosteroids), diabetes (p. 601)
- Mental problems (comorbidities are common):
  - Anxiety (p. 534)
  - Manic episode(s): elevated, expansive or irritable mood, excessive overactivity and impulsivity
  - Medically unexplained somatic symptoms (p. 557)
  - Schizophrenia (p. 545)
  - Substance abuse (p. 649)
  - Learning problems.

Treatment

- Develop a treatment plan together with the older child and adolescent and their caregiver, and specialists when needed. The specialist may propose various forms of psychotherapy (cognitive-behavioural therapy or family therapy).
- Provide guidance on child or adolescent well-being (p. 111).
- Provide psychosocial interventions addressing the child or adolescent, caregivers and teachers (p. 647).
- Encourage to reduce stress and participate in daily activities and community life:

- Discuss with the child or adolescent what might assist them to feel better.
- Identify prior social activities that, if started again, may potentially provide support, e.g. physical activity, social activities with friends and family.
- Explain that even if they find it difficult, starting or resuming activities that were previously pleasurable can help improve their mood.
- Encourage to strengthen relationships with parents and friends.
- Encourage regular sleep and waking times, regular eating habits.
- Link with other available resources in the community such as self-help groups, counselling services.
- Investigate whether the child or adolescent's environment can be improved (e.g. school setting, leisure activities).

▶ Involve caregivers as much as possible.

▶ Address sleep problems (p. 546) and other comorbidities such as anxiety (p. 534).

DO NOT consider pharmacological treatment as a first-line option.

When psychological interventions prove ineffective, refer to or consult a paediatric psychiatrist for psychopharmacological treatment (e.g. antidepressants).

Referral

Refer urgently, if:

- Acts of self-harm with signs of poisoning or intoxication, bleeding from self-inflicted wound, loss of consciousness or extreme lethargy
- Currently thinking about or planning acts of self-harm or suicide, or a history of thoughts, plans or acts of self-harm or suicide in a person who is extremely agitated, violent, distressed or unable to communicate (p. 530).

Refer to a specialist, if:

- Depression is lasting and serious
- No improvement after 2 to 6 months of first-line interventions.

Follow-up

Monitor progress and compliance with psychotherapeutic treatment. Reassess the child or adolescent's symptoms, behaviour and functioning at every visit.

If NO improvement:

- Provide additional psychoeducation and advice on parenting.
- Review psychosocial interventions and revise management plan.
- Involve child or adolescent and caregivers in decision-making.
- Offer regular follow-up at an increased frequency.
- Consider referral to a specialist (see above).

If improvement:

- Continue with management plan and follow-up until symptoms cease or remit.
- If on medication, consider gradually reducing medication dose in consultation with a specialist.
- If not on medication, decrease frequency of follow-up once symptoms have subsided and the child or adolescent is able to cope well with daily life.

Antidepressants may increase suicidal ideation. If prescribed, ask the adolescent to return weekly for the first 4 weeks, to assess for thoughts or plans of suicide (p. 531).

6.29 Suicidal thoughts or self-harm

Suicide is the act of intentionally killing oneself. Self-harm is a broader term referring to intentional self-inflicted injury (e.g. cutting).

Extreme emotional distress such as depression, substance use, extreme anxiety or behavioural problems should prompt an assessment of self-harm and suicidal thoughts.

While some suicidal thoughts are vague, pass quickly and do not pose an immediate threat, concrete plans must be taken very seriously and addressed.

Assessment

It is okay to talk about suicide. Asking about suicide and using the word "kill oneself" or "suicide" DOES NOT increase the risk that the child or adolescent may attempt to commit suicide.

Assess if the adolescent has attempted self-harm or suicide in the past or if there is a risk of self-harm or suicide:

- Try to establish a relationship with the child or adolescent before asking questions about self-harm and suicide.
- Ask questions about self-harm directly, e.g. "how do you feel about living?", "do you feel you have a future?", "have you ever tried to self-harm?", "have you ever attempted suicide?" or "do you have any thoughts or plans about how to commit suicide?"
- Express empathy if such thoughts or behaviour are disclosed: "I understand how difficult your situation is and feel how sad you must be to have such feelings" and "I thank you for trusting me and sharing these thoughts".
- If the child or adolescent has a plan in mind, explore whether they feel able to withhold acting if provided with support; if yes, find out what would help them to give up the plan.

Ask about:

- Current thoughts of or planning self-harm or suicide
- History of thoughts of or planning self-harm in the past month or acts of self-harm in the past year
- Frequency of these thoughts, what kind of plan is being considered, whether a method to commit suicide is readily available (e.g. firearm, rope, medication, bridge) and when the person imagines acting out this plan
- Mental problems or substance abuse
- Chronic pain
- History of similar problems, psychiatric hospitalizations, medications prescribed for mental illness, schizophrenia, substance abuse, past self-injuries or suicide attempts
- Family history of mental, neurological or substance abuse problems

- Psychosocial history:
  - Difficulty with daily life at home, school and in relationships
  - Stressors and triggering event, e.g. family disharmony, parental separation, domestic violence, being bullied, loss of a friend, family member, pet or romantic relationship
  - Coping methods and social support (family, school, community services)
  - Relationship with parents or caregivers
  - Situation at home, living conditions, household structure.

RED FLAGS

- Planning of the act with intention of death and absence of external triggering factors
- Verbalization of intention to die
- Use of violent or highly lethal method
- Personal or family history of mental health problems (mainly psychotic symptoms)
- Association with addictive behaviour, impulsivity, social isolation or withdrawal, sudden changes in mood
- Repeated episodes of self-harm or previous suicide attempts.

Management

If there is an imminent risk of self-harm or suicide (see red flags):

- Ensure immediate access to a mental health specialist. Consider hospitalization (depending on seriousness of the situation and availability of local mental health services). Bear in mind that the priority is to protect the child or adolescent.
- Remove methods or means of self-harm or suicide.

! **DO NOT** leave the child or adolescent alone at any time and during transfer to mental health specialist.

While organizing access to mental health specialist:

- Create a secure and empathic environment.
- Explore reasons and ways to stay alive.

- Focus on the child or adolescent's strengths by encouraging them to talk about how earlier problems were resolved.
- Disclose the situation to parents or trusted adults, after informing the adolescent.

The relationship with your patient may suffer if confidentiality is broken. However, confidentiality should be broken (e.g. caregivers should be involved) if there is a high risk of suicide. In this event, inform the patient of this breach and explain that it is your role to help save lives and reduce suffering.

If there is no imminent risk, but potential future risk of self-harm or suicide:

- Provide psychoeducation and support (p. 647).
- Provide support, psychoeducation and parenting advice to the parents or caregivers (p. 648).
- Refer to a mental health specialist, if available.
- Counsel the child or adolescent: if they think of self-harm or suicide, they should seek help immediately from a trusted family member, friend or doctor.
- Involve caregivers as much as possible, depending on the relationship and the wish of the adolescent.
- Inform caregivers about:
  - Risk signs for suicidal behaviour
  - Available local emergency support services, e.g. suicide hotline.
- Counsel and encourage the caregivers to:
  - Watch over the child.
  - Provide a secure and supportive environment at home.
  - Remove means of self-harm and suicide from the home including pesticides, firearms and medications. All medications should be locked away securely.
  - Broaden the social network and include family, peers and relevant others in providing social support to their child.

Follow-up

Maintain regular contact and follow up over time, as mood and mental health symptoms can fluctuate over a period of a few days or weeks.

6.30 Fear, anxiety, avoidance of situations or objects

Fear is the emotional response to a real or perceived threat. Anxiety is the anticipation of a future threat. Feelings of anxiety and fear are a natural and adaptive part of childhood development and normal in specific circumstances according to age (Table 85). Only when these emotions are experienced for prolonged periods of time, cause disabling distress or impact on the child or adolescent's ability to function in everyday life should they be considered a problem.

Table 85. Age-appropriate fears and anxieties

Age	Age-appropriate fears and anxieties
9 months to 2 years	• Fear of strangers, distress when separating from caregivers.
3 to 5 years	• Fears of storms, fire, water, darkness, nightmares and animals.
6 to 12 years	• Fear of monsters, ghosts, germs, natural disasters, physical illness and being badly injured. • Anxiety about school or about performing in front of others.
13 to 18 years	• Fear of rejection by peers, performing in front of others, physical illness, medical procedures, catastrophes (e.g. war, terrorist attack, disasters).

History

- Main fear and anxiety situation (Table 85)
- Characteristics of the fear:
  - — Frequency, duration, severity
  - — How and when fear started
  - — Specific thoughts associated with and triggers for episodes of fear and anxiety
  - — Associated symptoms during the episodes
  - — Interference with everyday life
- Coexisting problems:

- Sleeping problems (p. 546)
- Eating problems (p. 552)
- Behavioural problems (p. 540)
- Drug and substance abuse (p. 649)

- History of:
  - Similar problems
  - Psychiatric hospitalizations
  - Medications prescribed for mental, neurological or substance abuse problems
  - Suicide attempts
- Family history of anxiety or panic attacks
- Psychosocial history
  - Daily functioning at home, school and in relationships
  - Coping methods and social support (family, school, community)
  - Relationship with parents or caregivers
  - Situation at home, living conditions, household structure.

Different questionnaires exist to assess anxiety in children and adolescents which may be completed by the child or adolescent or by the caregivers, depending on the child's age. They should never replace a comprehensive history and should only be used if you are familiar with them.

Anxiety can be caused by different triggers. Identify the main fear and anxiety situation to identify the type of anxiety (Table 86).

Examination

Rule out underlying physical conditions that can resemble or exacerbate anxiety (see differential diagnosis below).

Differential diagnosis

Assess for conditions that can cause or be associated with anxiety:

- Hypoglycaemia (p. 602)
- Thyroid disease
- Asthma (p. 587)
- Cardiac arrhythmias (p. 332)
- Inflammatory bowel disease (p. 297)
- Migraine (p. 467)

- Intoxications
- Medication side-effects
- Depression (p. 526)
- Attention deficit hyperactivity disorder (p. 571)
- Child maltreatment (p. 637)
- Sleeping problems (p. 546)
- Eating problems (p. 552)
- Behavioural problems and conduct disorders (p. 540)
- Drug and substance abuse (p. 649)
- Learning difficulties.

Table 86. Types of anxiety

Diagnosis[a]	In favour
Anxiety	
Separation anxiety	Fear of being away from parents or trusted adults.
Social anxiety	Fear of social situations such as going to school, speaking or performing in front of others, reading out loud, interacting with adults or peers.
Phobias	Extreme fear about a specific thing or situation such as dogs, insects or going to the doctor.
General anxiety	Excessive and uncontrollable worry about events or activities.
Panic attacks	Repeated episodes of sudden, unexpected, intense fear accompanied by heart pounding, trouble breathing and feeling dizzy, shaky or sweaty.

[a] Check the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) for specific diagnostic criteria.

Management

Acute management during a panic attack

- Do not leave the child alone, make sure a trusted adult is present.
- Rule out organic conditions (e.g. asthma, hypoglycaemia, see differential diagnosis p. 535) and treat accordingly if any (see specific chapters).
- If the child or adolescent is breathing very rapidly, ask them to breathe into a bag.

Table 87. Differential diagnosis of anxiety

Diagnosis[a]	In favour
Post-traumatic disorder	• Development of intrusive symptoms (remembering the event, nightmares, flashbacks), avoidance behaviour and hypervigilance following exposure to a traumatic event.
Obsessive-compulsive disorder	• Obsessions (recurrent and persistent thoughts, urges or images that are experienced as intrusive and unwanted) followed by compulsions (repetitive behaviour and mental acts in response to the obsession).
Schizophrenia (p. 545)	• Problems with thinking and reasoning, puzzling ideas or speech, confusing dreams and reality • Withdrawal from friends and family • Trouble sleeping, lack of motivation and drop in school grades • Awkward or surprising behaviour, aggression and violent behaviour • Strange anxieties and fears, suspicion of others.

[a] Check the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) for specific diagnostic criteria.

- Encourage breathing exercises and relaxation.
- If the panic attack persists, consider giving an oral benzodiazepine such as diazepam 0.2 mg/kg in a single dose.

Long-term management

- Develop a treatment plan together with the older child and adolescent and caregivers, and specialists when needed.
- Provide psychosocial interventions addressing the child or adolescent, caregivers and teachers (p. 647).
- Provide guidance on general child or adolescent well-being (p. 111).
- Manage triggers, reduce stress and strengthen social support.
- Investigate whether the child or adolescent's environment can be improved, e.g. school setting, leisure activities.
- Link with other available resources in the community.

DO NOT consider pharmacological treatment as first-line treatment.

DO NOT prescribe pharmacological treatment for children younger than 12 years. Allow psychopharmacological treatment to be prescribed by a paediatric psychiatrist or consult with a specialist before prescribing it.

Referral

When serious cases or first-line interventions prove ineffective with no improvement after 2 to 6 months, refer to a paediatric psychiatrist, who may propose various forms of psychotherapy (cognitive behavioural therapy or family therapy) or prescribe medication (e.g. antidepressants).

Follow-up

Monitor progress and compliance with psychotherapeutic treatment, as for children with depression (p. 526).

6.31 Inattention or overactivity

Inattention, inability to stay still for long, lack of concentration, distractibility or difficulty completing tasks, overactivity and restlessness are common complaints from caregivers or teachers. In most cases, these behaviours are part of the normal development of the child and adolescent. However, when they are long-lasting and severe, or when they interfere with daily functioning and affect personal, family, social, educational or occupational life, they may be part of a deeper-seated problem (Table 88).

History

Assess whether inattention or overactivity can be considered normal behaviour or part of a problem. If ALL of the following symptoms are present, consider attention deficit hyperactivity disorder:

- Symptoms present in multiple settings (home, school, leisure activities)
- Symptoms last at least 6 months
- Symptoms are inappropriate for the child or adolescent's developmental level
- Considerable difficulty with daily functioning at home, school and in relationships.

Consider the use of behaviour rating scales to collect structured behavioural symptoms. These scales can be completed by the child or adolescent, as well as parents and teachers.

Differential diagnosis

Table 88. Differential diagnosis of inattention or overactivity

Diagnosis[a]	In favour
Attention deficit hyperactivity disorder (p. 571)	• Excessive inattention • Inability to concentrate on a task for more than a few minutes • Often losing personal belongings • Excessive overactivity • Excessive impulsivity.
Substance abuse (p. 649)	• History of repetitive substance use • Injuries, violence • Tolerance and withdrawal symptoms.
Depression, bipolar syndrome (p. 526)	• Feeling sad, irritable or down • Lost interest or enjoyment in activities • Manic episodes: elevated, expansive or irritable mood, excessive overactivity and impulsivity.
Oppositional defiant disorder, conduct disorder (p. 540)	• Excessive behavioural symptoms such as anger, temper tantrums, arguing with adults, refusing to comply with adult rules and requests • Stealing, repetitive lying • Behaviour present in all settings (home, school, leisure activities).
Schizophrenia (p. 545)	• Problems with thinking and reasoning, puzzling ideas or speech, confusing dreams and reality • Withdrawal from friends and family • Trouble sleeping, lack of motivation and drop in school grades • Awkward or surprising behaviour, aggression and violent behaviour • Strange anxieties and fears, suspicion of others.
Organic causes	• Symptoms and signs suggesting thyroid disease • Symptoms and signs suggesting acute or chronic infection including HIV/AIDS (p. 623) • Uncontrolled pain, e.g. otitis media (p. 210), sickle cell disease (p. 614) • Intense itchiness, e.g. severe atopic dermatitis, Wilson's disease.

[a] Check the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) for specific diagnostic criteria.

Management

- Refer to a specialist to confirm the diagnosis.
- For management, see sections for the specific conditions (page references in Table 88).

6.32 Anger, temper tantrums, disobedience

Behavioural symptoms of varying levels of severity, such as anger, temper tantrums, arguing with adults or refusing to comply with adults' rules and requests, are very common during childhood and adolescence and often transient.

Some children and adolescents exhibit extremely difficult and challenging behaviour that is outside the norm for their age: **behavioural problems** may result from temporary stressors in the child's life, or represent more enduring problems. Only children and adolescents with a lasting, moderate-to-severe degree of psychological, social, educational or occupational difficulties in different settings should be diagnosed as having behavioural problems. Boys are more likely than girls to suffer from behavioural problems.

The most common disruptive behaviour problems are **oppositional defiant disorder (ODD)** and **conduct disorder (CD)**. Both disorders may be similar and lie on a continuum with a progression from ODD to CD with increasing age. Children with ODD usually manifest this behaviour pattern before 8 years of age among people they know well, such as family members or a teacher. CD is a more serious condition which is typically not diagnosed until adolescence. Adolescents with CD may violate social rules that involve breaking the law. In addition, their acts may lead to serious injuries.

Symptoms

- Extreme irritability and anger
- Frequent and severe temper tantrums
- Arguing with adults
- Defying or refusing to comply with their requests or rules
- Difficulty getting along with others
- Provocative behaviour
- Excessive levels of fighting or bullying
- Cruelty to animals or people
- Severe destructiveness to property, fire-setting

- Stealing, repeated lying, absence from school, running away from home.

Consider behavioural problems, if ALL of the following are present:

- Symptoms present in multiple settings (home, school, leisure activities)
- Symptoms last at least 6 months
- Symptoms are more severe than ordinary childish mischief or adolescent rebelliousness (see Table 89) and have a persistent pattern which violates the basic rights of others
- Symptoms cause major difficulty with daily functioning at home, school and in relationships.

DO NOT assign the diagnosis "conduct disorder" in view of the associated stigma. Refer to a specialist for thorough assessment and diagnosis based on strict diagnostic criteria (see Diagnostic and Statistical Manual of Mental Disorders (DSM-5)).

Differential diagnosis

Assess whether the behaviour or conduct complaints can be considered normal behaviour (Table 89).

Table 89. Age-appropriate disruptive or challenging behaviour

Age	Disruptive or challenging behaviour
18 months to 5 years	• Refusing to do what they are told, breaking rules, arguing, whining, exaggerating, telling lies, denying they did anything wrong, physically aggressive, blaming others for their misbehaviour. • Brief tantrums (emotional outbursts with crying, screaming, hitting) lasting < 5 minutes and not longer than 25 minutes, < 3 times per week. • Tantrums do not result in self-injury or frequent physical aggression towards others • Child is able to calm down after tantrum.
6 to 12 years	• Avoidance of or delay in following instructions, complaining or arguing with adults or other children, occasionally losing their temper.
13 to 18 years	• Testing rules and limits, insisting rules and limits are unfair or unnecessary, occasionally being rude, dismissive, argumentative or defiant with adults.

Consider the following other causes or coexisting conditions:

- Attention deficit hyperactivity disorder (p. 571)
- Neglect (p. 637), violence in families, stressful home environment
- Substance use and abuse (p. 649)
- Learning disabilities
- Schizophrenia (p. 545).

Management

Management of serious behavioural disorders is complex and challenging.

- Determine whether the problems can be managed with advice and reassurance or if the child requires specialist referral.
- Provide guidance on child or adolescent well-being (p. 111).
- Provide psychosocial interventions addressing the child or adolescent, caregivers and teachers (p. 647).
- Investigate whether the child or adolescent's environment can be improved (e.g. school setting, leisure activities).
- Assess for and manage stressors (e.g. violence in the family and social environment), reduce stress and strengthen social support.
- Link with other available resources in the community.
- Offer follow-up.

DO NOT offer pharmacological treatment.

Referral

- Refer serious cases to a specialist for assessment and a comprehensive treatment plan.
- If no improvement or predicted danger to the child, refer to a specialist for further assessment and advice on the management plan.

6.33 Difficulties with social interaction and communication

Communication is fundamental in everyday life. It is important for early identification and support to know at what age developmental milestones are expected to be reached (p. 61) and when difficulties in social interaction and communication indicate a problem such as autism spectrum disorder.

History

Take a comprehensive history, usually from the caregivers, but also from teachers. Assess all developmental domains according to age, including language, movements, social interaction, play activities (p. 60). Ask about:

- Concerns regarding language, speech, hearing and vision
- Social and communicative behaviours: relationships with and interest in adults and other children, preference for playing alone, responsiveness to other people's feelings, understanding of and adhesion to social norms
- Play patterns: imaginative or repetitive
- Ability to cope with changes in the daily routine
- Family history of mental, neurological or substance abuse problems
- Neglect (p. 637), violence in families, stressful home environment
- Psychosocial history:
  - Coping methods and social support (family, school, community services)
  - Functioning at home, school and in relationships
  - Relationship with parents or caregivers
  - Situation at home, living conditions, household structure.

Examination

- Observe facial expression and eye contact throughout the visit
- Perform a hearing assessment.

Differential diagnosis

Consider conditions causing or associated with deficits in social interaction and communication (Table 90). Check the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) for specific diagnostic criteria and refer to a specialist to confirm the diagnosis.

Table 90. Differential diagnosis of deficit in social interaction and communication

Diagnosis	In favour
Autism spectrum disorder (p. 569)	• Reduced eye contact and facial expressions • Slow acquisition of language, reduced use of language • Reduced social interest in others • Repetitive pattern of behaviour, interests or activities.
Global delay/ intellectual disability	• Delay in reaching milestones • Social response and communication usually appropriate for developmental level.
Language problems (developmental or language-based learning disorder)	• Difficulties or delay in the use of language • Reduced vocabulary • Difficulties understanding words or sentences • Normal desire and intention to communicate • Normal social interaction.
Hearing problems	• Hearing loss of any cause • Normal social interaction • Normal eye contact, normal facial expressions.
Fetal alcohol spectrum disorder (p. 582)	• History of maternal alcohol consumption during pregnancy • Facial features: short palpebral fissures, thin upper lip, smooth philtrum • Growth retardation • Deficit in social interaction • Learning disabilities.
Attention deficit hyperactivity disorder (p. 571)	• Excessive inattention • Inability to concentrate on a task for more than a few minutes • Often losing personal belongings • Excessive overactivity • Excessive impulsivity.

Diagnosis	In favour
Oppositional defiant disorder and conduct disorder (p. 540)	• Anger, temper tantrums, arguing with adults, refusing to comply with adult rules and requests • Stealing, repetitive lying • Behaviour present in all settings (home, school, leisure activities).
Schizophrenia (p. 545)	• Problems with thinking and reasoning, puzzling ideas or speech, confusing dreams and reality • Withdrawal from friends and family • Trouble sleeping, lack of motivation, drop in school grades • Awkward or surprising behaviour, aggressive and violent behaviour • Strange anxieties and fears, suspicion of others.
Problematic use of internet and social media (p. 653)	• Use of screens or mobile devices for many hours and late at night with harmful use, such as displaying and exchanging sexist and racist opinions, cyberbullying, boasting of illicit activities or self-harming behaviour.
Substance abuse (p. 649)	• History of repetitive substance use • Injuries, violence • Tolerance and withdrawal symptoms.

6.33.1 Schizophrenia

Schizophrenia is a condition that generally first manifests in late childhood and adolescence. It is characterized by a variety of problems in thinking, behaviour or emotions. It often has a massive and lasting impact on the health, social and professional life of those affected and their families. It is thus important to identify as soon as possible individuals who may be schizophrenic and refer them for specialist care.

Signs and symptoms

Early warning signs include:

- Problems with thinking and reasoning, puzzling ideas or speech, confusing dreams and reality
- Withdrawal from friends and family
- Trouble sleeping, lack of motivation and drop in school grades

- Awkward or surprising behaviour, aggressive and violent behaviour
- Drug abuse
- Irritability or depressed mood
- Strange anxieties and fears, suspicion of others.

Over time, other symptoms often appear, including:

- Delusions e.g. beliefs that are not based in reality
- Hallucinations e.g. hearing voices or seeing things that do not exist
- Confused thinking and speech
- Poor personal hygiene, monotonous speech, absence of emotion.

Referral

If you suspect such a condition, refer to a mental health professional for a thorough assessment and initiation of treatment.

6.34 Sleeping problems

The recommended length of good quality sleep decreases with age, from 14–17 hours in the first few months of life to 8–10 hours in late adolescence. It is important to identify sleeping problems that may interfere with the development of the child or adolescent.

6.34.1 Excessive daytime sleepiness, difficulty in falling or staying asleep (insomnia)

Excessive daytime sleepiness is a common parental complaint especially concerning adolescents. Note that in children, excessive sleepiness may present as inattention, overactivity or irritability rather than overt sleepiness.

History

Identify the main complaint. Use the BEARS acronym to remember the basic areas to explore:

- **B**edtime issues: problems going to bed or falling asleep
- **E**xcessive daytime sleepiness: overtired or sleepy during the day, naps, difficulty waking up in the morning
- Night **A**wakenings: waking up at night, sleepwalking, nightmares
- **R**egularity and duration of sleep: sleep schedule during weekdays and at weekend, enough sleep at night

- **S**leep-disordered breathing (snoring): difficulties in breathing during sleep, loud snoring (p. 551).

If the reply is no to ALL the above questions, it is unlikely that the child or adolescent has a sleeping problem. Reassure the family and counsel on healthy sleep practices (Counselling box 40).

If there is a positive reply, proceed with further assessment:

- Main complaint: duration, frequency, variation from night to night
- Any associated symptom
- Medication intake, substance use, and caffeine or similar stimulants prior to sleep
- Any medical or psychological stressor
- Parental sleep pattern.

Differential diagnosis

Table 91. Differential diagnosis of excessive daytime sleepiness, difficulty in falling or staying asleep (insomnia)

Diagnosis	In favour
Insufficient sleep	• Main cause of daytime sleepiness (see p. 102 for recommended amount of sleep according to age).
Excessive use of internet and social media (p. 653)	• Use of screens or mobile devices for many hours and late at night.
Substance use and abuse (p. 649)	• History of repetitive substance use • Injuries, violence • Tolerance and withdrawal symptoms.
Depression, bipolar syndrome (p. 526)	• Feeling sad, irritable or down • Loss of interest or enjoyment in activities • Manic episodes: elevated, expansive or irritable mood, excessive overactivity and impulsivity.
Anxiety (p. 534)	• Feeling very afraid of specific things or situations • Usually caused by triggers • Can present as panic attacks.

Diagnosis	In favour
Schizophrenia (p. 545)	• Problems with thinking and reasoning, puzzling ideas or speech, confusing dreams and reality • Withdrawal from friends and family • Trouble sleeping, lack of motivation and drop in school grades • Awkward or surprising behaviour, aggressive and violent behaviour • Strange anxieties and fears, suspicion of others.
Delayed sleep-wake phase disorder	• Usually adolescents • Actual sleep schedule (time of going to bed and waking up) displaced in relation to beneficial sleep schedule (circadian rhythm disturbance).
Obstructive sleep apnoea (p. 551)	• Snoring • Adenoid hypertrophy • Nasal septal deviation • Mouth breathing, apnoea.
Narcolepsy	• Sudden episodes of falling asleep during any daytime activities such as eating or speaking • May be associated with sudden loss of tone (cataplexy) • School failure is frequent.

Management

Identify possible underlying cause and address accordingly. See page references in table above.

- If you suspect any condition that needs further assessment or investigations (e.g. polysomnography), refer to a specialist to confirm the diagnosis and management.
- If you identify minor issues such as insufficient sleep or difficulty initiating or maintaining sleep:
  - — Counsel on healthy sleep (Counselling box 40)
  - — Advise limiting or stopping consumption of caffeine-containing products (coffee, green tea, energy drinks)
  - — Assess for and manage psychological stressors, reduce stress and strengthen social support.

Counselling box 40. Healthy sleep for children and adolescents

Healthy sleep

- Set a specific bedtime: bedtime and wake-up time should be similar between weekdays and weekends and not differ by more than an hour from day to day.
- Introduce a quiet time before bedtime.
- Maintain a bedtime routine, which may include reading, presence of one parent or caregiver as the child falls asleep.
- Keep the bedroom quiet, dark (or faint light) and at a comfortable temperature.
- Keep all screen devices outside the bedroom: watching television and the use of any screen device should be avoided before bedtime.
- Encourage the child to undertake some kind of physical activity every day and spend time outside whenever possible, but not during the 1–2 hours before bedtime.
- Avoid heavy meals within an hour before bedtime.

In addition, for adolescents:

- Avoid caffeine-containing products, in particular in the afternoon and evening.
- Set up limits for screen use.

- If delayed sleep-wake phase disorder:
  - — Rule out depression and anxiety
  - — Counsel on healthy sleep practices (Counselling box 40)
  - — Advise against taking naps
  - — Advise relaxation techniques before sleep.
- If you suspect narcolepsy, refer to a specialist to confirm the diagnosis.

6.34.2 Unusual movements or behaviour during sleep

Caregivers may be worried about unusual movements or behaviour during the sleep of their child. Most movements or behaviours are harmless and stop as the child grows older (Table 92).

History

- Characteristics of movements:
  - Age of presentation
  - Frequency (every night?)
  - Description of the movements, part of the body affected by the movements. Consider asking the caregivers to bring a recording of the movements.
- Family history of sleep problems.

Differential diagnosis

Table 92. Differential diagnosis of movements during sleep

Diagnosis	In favour
Benign neonatal sleep myoclonus	• Young infants • Brief jerks, bilateral, symmetrical, usually of extremities, that sometimes wake up the child • Occurs at night • Disappears within a few months of life.
Rhythmic movement disorder	• Early childhood • Rhythmic movements of the head (head banging or rolling) or trunk (rocking) • Onset before sleep and maintained until light sleep • Usually resolves by 5 years of age. **Note:** Only considered a problem when it interferes with normal sleep or leads to self-injury
Periodic limb movement disorder	• Any age • Repetitive brief movements of the legs (sometimes arms) that interfere with sleep (until child wakes up) • Leads to daytime sleepiness and problems with concentration • Commonly associated with restless legs syndrome.
Parasomnias	• Young children • Not every night • Sleepwalking, sleep terrors • Family history of parasomnias.

Management

- If you are not sure about the diagnosis or if the sleep problems impact life during daytime, consider referral to a specialist.
- Reassure the caregivers that the following conditions are harmless and usually self-limiting: benign neonatal sleep myoclonus, rhythmic movement disorder, parasomnias.
- In the event of parasomnias:
  - Explain that parasomnias are not related to mental or neurological disorders
  - If frequent episodes, consider referral to a specialist.
- If you suspect periodic limb movement disorder:
  - Refer to a specialist for polysomnography to confirm the diagnosis
  - Check serum ferritin levels as low serum ferritin levels are common in children with periodic limb movements. If low, give iron supplementation (p. 409), as this may improve the periodic limb movement.
- If major movements, consider protective measures to prevent injury.

6.34.3 Snoring

Children and adolescents with a common cold or rhinitis can snore for a few nights without requiring further assessment. For children or adolescents snoring more than 3 times a week for more than 3 consecutive weeks in the absence of underlying common cold or rhinitis, consider sleep breathing disorders such as severe obstructive sleep apnoea. Breathing difficulties are common in school-age children with adenoid hypertrophy or obesity.

History and examination

- Sleeping problems (p. 546)
- Risk factors for snoring:
  - High blood pressure
  - Obesity
  - Passive tobacco smoke
  - Adenoid or tonsillar hypertrophy (p. 220)
  - Nasal septal deviation, history of facial trauma
  - Chronic respiratory diseases: asthma (p. 587) or cystic fibrosis (p. 598)

- — Neuromuscular disorders, e.g. cerebral palsy (p. 578)
- — Disorders with craniofacial dysmorphism, e.g. achondroplasia

- Inattention, overactivity, impulsivity, irritability
- Nocturnal enuresis (p. 361)
- Symptoms of obstructive sleep apnoea: while sleeping, presence of paradoxical chest-abdomen movements, chest indrawing, apnoeic episodes, excessive sweating, continuous mouth breathing.

Management

- If you suspect obstructive sleep apnoea, refer to a specialist for further assessment and management plan.
- Address possible risk factors, such as obesity (p. 517) and high blood pressure (p. 342).
- For adenoid hypertrophy, see p. 220.
- For nasal septal deviation, see p. 221.

6.35 Eating problems, fear of gaining weight

Eating problems are a frequent complaint at the primary health care level. Presentation of eating problems ranges from parental complaints that their young child is not eating enough to obesity and eating disorders such as anorexia nervosa in adolescents (Table 93).

History

- Feeding or eating history: number of meals per day, timing of meals (breakfast, lunch and dinner) and components of meals
- Living environment, social situation and family situation

  Note: Exposure to a problematic family situation or child maltreatment can influence appetite and eating habits
- Contributing factors to eating problems:
  - — Mealtime arrangements and practices
  - — Types of food offered
  - — Presence of food aversion and avoidance
  - — Unfavourable interactions between caregivers and infant
  - — Insufficient response of caregivers to child's mealtime cues
  - — Appetite, e.g. lack of interest in eating
  - — Presence of condition or illness affecting feeding

- Parental dietary habits (vegetarian, vegan)
- Signs of eating disorders:
  - Distorted body image and pathological fear of becoming fat
  - Unhealthy weight control behaviours such as self-induced vomiting, excessive dieting, misuse of laxatives, diuretics or other medications, fasting or excessive exercise
- Known medical condition, usual medication intake.

Examination

- Perform a full physical examination.
- Measure weight and length or height and evaluate growth (p. 119).

Management

Manage according to findings of history, examination and growth evaluation.

Table 93. Assessment and management of eating problems

Assessment	Management
• Child or adolescent eats adequate amounts ("enough" and not "too much") despite the parental perception • Growth evaluation shows *normal growth*.	▶ Reassure the family and provide nutritional counselling (p. 81).
• Child or adolescent tends to eat too much, not enough or has bad eating habits • Growth evaluation shows *normal growth*.	▶ Identify possible cause of changes in eating habits, e.g. underlying acute infection, depression, substance abuse. ▶ Provide nutritional counselling (p. 81). ▶ Follow-up.
• Growth evaluation shows *malnutrition, thinness or growth faltering*.	• See p. 512 for full assessment and management.
• Growth evaluation shows *overweight or obesity*.	• See p. 517 for full assessment and management.
• Signs suggestive of *eating disorders*.	• See p. 552 for full assessment and management.

Note: overweight and obesity, eating disorders and unhealthy weight control behaviours are not mutually exclusive and can coexist.

6.35.1 Eating disorders

Eating disorders are characterized by a persistent disturbance of eating or eating-related behaviour that results in the altered consumption or absorption of food and significantly impairs physical health or psychosocial functioning. Most eating disorders start between the ages of 12 and 25 years.

Assessment

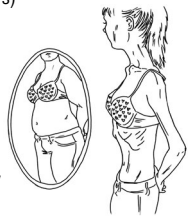
Consider using screening tools for eating disorders, for example:

- Screening questions which correlate highly with the Eating Attitudes Test (EAT-26):
  - How many diets have you been on in the past year?
  - Do you feel you should be dieting?
  - Do you feel unhappy with your body size?
  - Does your weight affect the way you feel about yourself?
- SCOFF questionnaire (meeting ≥ 2 criteria indicates an eating disorder and need for further assessment):
  - **Sick:** "From time to time, do you voluntarily vomit after eating because you feel bad?
  - **Control:** "Are you worried about the idea of losing control of what you eat?"
  - **One stone:** "Have you recently lost at least 6 kg over a period of 3 months?"
  - **Fat:** "Do you think you're too big while others think it's not the case?"
  - **Food:** "Does food dominate your life?"

Differential diagnosis

Differentiate between different eating disorders (Table 94). In some cases, adolescents may cross over from one eating disorder to another.

Table 94. Differential diagnosis of eating disorders

Diagnosis[a]	In favour
Binge-eating	• Recurrent episodes of eating in a discrete period of time (e.g. within any 2-hour period) significantly more food than most people would eat • Feelings of lack of control over eating during binge episodes, accompanied by guilt, depression, embarrassment or self-disgust • May eat so quickly that they feel uncomfortably full, even when not hungry • May binge-eat alone to hide their behaviour • Episodes occur, on average at least once a week over three months.
Bulimia nervosa	• Frequent episodes of binge-eating followed by recurrent inappropriate compensatory behaviour (e.g. self-induced vomiting, misuse of laxatives, diuretics or other medications, fasting or excessive exercise) in order to prevent weight gain • Episodes occur, on average, at least once a week for three months.
Anorexia nervosa	• Mainly girls (peak age at 15 years) • Distorted body image; body weight or shape play an exaggerated role in self-image • Intense fear of gaining weight or becoming fat • Excessive dieting that leads to severe weight loss, and continues despite a significantly low weight • Persistent lack of recognition of the seriousness of current low body weight • Two subtypes: restricting and binge-eating/purging type. 

[a] Check the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) for specific diagnostic criteria.

Identify physical and psychological comorbidities including amenorrhoea (p. 702), electrolyte imbalances, depression, anxiety, self-harm, obsessive-compulsive disorder, and suicidal ideas or attempts.

Management

Early detection and a multidisciplinary approach are key factors for success in the management of eating disorders.

Most patients can be treated as outpatients by a specialist, but some may need partial hospitalization, or inpatient or residential settings.

- Involve a multidisciplinary team in the management. If possible, include a psychologist, a nutritionist and a social worker.
- Good communication within the team is crucial.
- With the help of the multidisciplinary team, ensure:
  - Medical and nutrition intervention
  - Psychological intervention, e.g. cognitive behavioural therapy
  - Family therapy.
- When a specialized team is not available, especially when the situation is at an early stage or not critical, discuss support with the adolescent and caregivers and define some rules and strategies e.g. how to proceed with meals and find alternatives to binge-eating crises.
- Monitor for complications according to the specialist plan, including electrocardiogram, serum electrolytes.
- Address comorbidities such as depression (p. 526) or anxiety (p. 534).

Referral

RED FLAGS

Consider **urgent referral** for hospitalization if:

- ≤ 75% median body mass index for age and sex
- Arrested growth and development
- Dehydration, electrolyte disturbance (hypokalaemia, hyponatraemia, hypophosphataemia)
- Electrocardiogram: prolonged QTc or severe bradycardia
- Severe bradycardia, hypotension, hypothermia

- Acute complications of malnutrition such as syncope, seizures, heart failure, pancreatitis
- Acute food refusal, uncontrollable bingeing and purging
- Additional mental or medical condition that hinders outpatient treatment (e.g. severe depression, suicidal thoughts, obsessive-compulsive disorder, type 1 diabetes mellitus)
- Failure of outpatient treatment.

6.36 Recurrent, unexplained physical symptoms

Somatic symptom disorder and related conditions

Recurrent and unexplained symptoms are the main complaint of **somatic symptom disorder and related conditions**. The child or adolescent complains about symptom(s) that disturb their well-being and life without any detectable underlying condition (Table 95). Such problems are not uncommon during adolescence, since they represent a way of expressing uneasiness, unhappiness or anxiety and depression related to their growing body and changing self-image. They are more common in girls.

The symptoms are real: the person is not faking the illness and truly believes that he or she is ill.

These symptoms often lead to numerous investigations (e.g. laboratory tests, imaging) that are ultimately negative and frustrating for the patient, family and a puzzling situation for the physician. It is thus important, if such a condition is suspected, to focus on both appropriate medical investigations AND the mood and well-being of the adolescent.

History

Take a detailed history to rule out any somatic conditions:

- Main complaint: common symptoms are chronic fatigue, headache, pain, dizziness, difficulty with walking or breathing
- When and how did the symptoms appear?
- Any triggering event or stressor:
  - — Violence in the family
  - — History of bullying, sexual violence, child maltreatment (p. 637)
  - — Parental divorce or unresolved grief
  - — In adolescents: romantic break-up, concerns and worries about sexual orientation

- Repercussion of symptoms in daily life:
  - Missing school, refusal to go to school
  - Inability to engage in sports and physical activities
  - Decrease in leisure activities and contact with peers.

Examination

- Carry out a detailed physical examination. If necessary, repeat examination during follow-up visits.
- Examination is usually normal.

DO NOT miss any undiagnosed medical condition!

Investigations

Full blood count and imaging to rule out possible diseases, if appropriate. Be careful to avoid unnecessary investigations.

Differential diagnosis

Table 95. Main somatic symptom disorder and related conditions

Diagnosis[a]	In favour
Somatic symptom disorders	• Physical symptoms (such as chronic fatigue, headache, pain, dizziness, difficulty with walking or breathing) leading to significant distress and problems in daily life • Symptoms are unrelated to any physical condition or more severe than could be expected • Excessive thoughts, feelings, and behaviour in response to these symptoms.
Conversion disorder or functional neurological disorder	• Neurological symptoms that cannot be explained by a neurological or medical condition, leading to significant distress and problems in daily life • Symptoms: weakness, paralysis, tremors, episodes of shaking, loss of balance, speech problems, visual problems (blurred, double vision), hearing problems.

[a] Check the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) for specific diagnostic criteria.

Rule out other causes or conditions that can mimic such disorders:

- Depression (p. 526), panic disorder (p. 534) or schizophrenia (p. 545)
- Illness fabricated or induced by parents or caretakers previously known as "Munchausen syndrome by proxy" (p. 640).

Management

- Consider referring to a specialist to confirm the diagnosis.
- Explain to the child or adolescent that their symptoms and pain are real and not imaginary and reassure them that they do not suffer from an organic illness. Some symptoms may arise from stress or depression.
- Counsel on a healthy lifestyle such as a healthy diet (p. 81) and regular physical activity (p. 103).
- Encourage the child or adolescent to progressively resume their everyday activities with the support of their parents or caregivers, and physiotherapist and school staff.
- Set up concrete actions on how to overcome symptoms and initiate resumption of some activities; tailor the environment to the adolescent's capacity, e.g. reduced school attendance, increasing physical activity.

Follow-up

- Organize regular appointments with the family to assess improvement.
- If the situation is lasting, provide psychoeducation (p. 647) or refer to psychologist for cognitive behavioural therapy.

Notes

CHAPTER 7

Diseases and conditions

The child or adolescent who might have or has …

7.1 Complex care needs

Children or adolescents with complex care needs are young patients with a combination of chronic conditions, mental health problems, drug interactions and social vulnerability. They may have:

- Several coexisting and interacting conditions
- A disability or long-term developmental difficulties (p. 565)
- Emotional and behavioural problems (p. 645)
- Palliative care needs (p. 655).

Providing care for children and adolescents with complex care needs

The aim is to enable a child to live life to the fullest, within the child's own capabilities.

Care coordination

Provide and coordinate continuous support and care for as long as the child needs it and avoid fragmentation of services. The quality of your relationship with the child and family can influence the outcome of long-term care and treatment, and help the child to live a good life and to develop self-management skills, self-esteem and independence.

- Coordinate care with specialists and multidisciplinary teams.
- Follow and explain specialist advice to the family.
- Support the family's goals.
- Develop a care plan with the family and child. Provide a copy to the family and all providers involved in the care of the child. The plan should include:
  - Child and parents' care goals
  - A problem list
  - Plan for the child's care for the next year
  - Specialists
  - Rehabilitative therapies, e.g. physiotherapy
  - Medication list with dosages and frequency of administration
  - Diet or feeding plans
  - Physical activity plans

- Medical equipment, e.g. walker, wheelchair, adaptive seating
- Home health care services (home nursing/domiciliary care)
- Educational support and plans
- Contingency plans for illness and travel
- Contact information of all health care providers.

- Provide prescriptions for:
  - Medications
  - Nappies and other home hygiene supplies (bathing systems, catheters)
  - Assistive medical devices, technology and equipment (wheelchair, insulin pump, supplemental oxygen, orthotics)
  - Hearing aid and glasses.
- Organize referrals and facilitate access to:
  - Specialists
  - Rehabilitative therapies (occupational therapy, physiotherapy, speech therapy)
  - Nutrition therapy, e.g. feeding tubes, swallowing therapy, special diets
  - Dental care for check-ups and treatment
  - Home health care services (home nursing/domiciliary care)
  - Behavioural or mental health care
  - Respite or hospice care
  - Family therapy and mental health counselling
  - Child and family support groups
  - Safe transportation services
  - Guardianship, power of attorney
  - Educational services or social services
  - Financial support to minimize out-of-pocket expenditure.
- Anticipate and organize the transition from paediatric towards adult services for adolescents.

Family-centred approach

Support children with complex care needs and their families to ensure the child's physical, cognitive, emotional and social development.

- Make decisions jointly based on the child's evolving capacity to understand (p. 4, p. 666).

- Engage caregivers in their child's treatment, as they are the child's main attendants in most situations. They should know what is being done and why, to give them some control over their child's problems.
- Listen to the caregivers' feelings regarding their child's condition.
- Encourage caregivers to develop a good, strong emotional bond with their child.
- Encourage caregivers to help the child develop self-reliance and increasing responsibility for self-care, depending on the child's developmental level.
- Be aware of the family's needs and the ability to cope with the situation. Monitor for effects of the child's condition on family life, well-being and economic situation, and link to appropriate services.

Anticipatory guidance

- Prepare the children and their families for possible:
  - Effects of the illness on the child's development, behaviour, ability to perform activities of daily living and family life
  - Illness exacerbation or relapse
  - Future procedures
  - Changes in treatment or effectiveness of medications.
- Encourage families to prepare an emergency plan, e.g. for asthma, epilepsy.
- Encourage the child to participate in age-appropriate activities, including sports, music, art and skill development, attend school and develop and maintain relationships with peers.

Routine health care

- Provide care for intercurrent illnesses.
- Provide immunizations as per local routine immunization schedule unless stated otherwise (p. 69).
- Ensure regular vision and hearing assessments.

Follow-up and monitoring

Children with complex care needs generally require more frequent visits, at least every 3–6 months.

- Schedule regular follow-up.

- Assess and address the following at follow-up visits:
  - Development of the condition
  - Problem with medication, e.g. effectiveness, side-effects
  - Other aspects of therapy: diet, exercises, physiotherapy
  - Adherence to therapy
  - Other health concerns, e.g. pain, concerns about growth
  - Mood, self-esteem and self-image, confidence in future, social activities, depression, anxiety
  - Impact of the condition on everyday life, family and social life and education, e.g. missing school
  - Need for further information about the disease and treatment.
- Monitor for emerging:
  - Complications of the specific condition
  - Emotional and behavioural problems (p. 645)
  - Developmental difficulties (p. 565)
  - Changes in the support requirements of the family
  - Signs of maltreatment and neglect (p. 637).

7.2 Developmental difficulties

Developmental difficulties often start during early childhood and can become apparent when developmental milestones are not met. Developmental difficulties in childhood can be caused by common preventable conditions such as lack of responsive caregiving, iron deficiency and undernutrition. They can also be caused by neurodevelopmental disorders. Neurodevelopmental disorders are related to development and growth of the central nervous system and include:

- Genetic conditions, e.g. Down syndrome (p. 573)
- Traumatic brain injury, e.g. birth injuries
- Cerebral palsy (p. 578)
- Conditions due to toxins, e.g. fetal alcohol spectrum disorder (p. 582)
- Tics, e.g. Tourette's syndrome
- Learning disorders, e.g. dyslexia, dyscalculia
- Communication, speech and language disorders
- Attention deficit hyperactivity disorder (p. 571)
- Autism spectrum disorder (p. 569).

It is important to detect those conditions as early as possible so that adequate support can be provided. The following red flags should prompt a first assessment and, if needed, referral to specialists (e.g. speech therapists, psychologists).

Signs of developmental difficulties

All ages:

- Difficulty in carrying out daily activities according to the child's age
- Difficulty in understanding instructions
- Difficulty in social interactions and adjusting to changes
- Difficulties with communication
- Repetitive patterns of behaviours, interests and activities.

Infants and children ≤ 5 years:

- Developmental milestones not met (p. 62)
- Regression or lost milestones
- Slow acquisition of self-care skills: dressing, bathing, brushing teeth.

Children 6–12 years:

- Slow acquisition of reading and writing skills
- Poor school performance: inattention, hyperactivity, disturbing behaviour in the classroom
- Difficulties in interacting with peers.

Adolescents 13–18 years:

- Poor school performance: inattention, hyperactivity, disturbing behaviour in the classroom
- Engaging in risky behaviours: experimenting with drugs, excessive risk-taking in sports and hobbies, practising unsafe sex.

History

Assess:

- Developmental milestones (p. 61)
- Social and communication skills, and capacity to adapt to different situations (ask parents and teachers)
- Family functioning

- Social environment and relations with peers
- Difficulties at school: memory, learning, reading and writing.

Management of developmental difficulties

The engagement of parents, health care professionals and, of course, the child can enable life to be lived to the full extent of the child's own abilities. The aim is to provide long-term support and guidance to the child and family throughout childhood, adolescence and beyond.

Support the family

Caregivers and other family members play a central role in child development.

- Seek the caregivers' thoughts about the child's development. They may provide information (e.g. on early learning environment at home) which can help you plan interventions.
- Reassure caregivers that they are not to blame for the difficulties.
- Counsel caregivers how to support their child's development (p. 66).
- Provide a window of hope without denying the seriousness of the child's health situation. Life with a developmental difficulty is possible but needs a creative and flexible approach. If parents are having difficulties, help them find a positive attitude towards life with their child.
- Be the child and family's partner, guide and advocate, and build a team around the child.

Psychological and emotional well-being of the child and family

- Support and monitor psychological and emotional well-being of the child and parents or caregivers.
- In parents or caregivers look for signs of:
  - Difficulty in coming to terms with the child's health problem, e.g. parents avoiding their child, denial of the problem
  - Lack of involvement in child's activities
  - Depression.
- In the child look for signs of:
  - Physical and emotional abuse and neglect (p. 637)
  - Emotional deprivation
  - Depression (p. 526).

Care coordination

- Be aware of local services that can support families, e.g. early intervention services (below).
- Link the family to services based on the child and family's needs. If services are not available, reassure caregivers that what they provide at home is likely to be the most useful service of all.
- Partner with the family to plan consultations, laboratory tests, interventions and follow-up.
- Avoid fragmentation of services, conflicting information and advice from different sources. Children and families benefit most when all or most of the services they receive take place within the same setting.

Early intervention services

- Start early intervention as soon as you identify developmental difficulties:

  DO NOT delay intervention while waiting for specialist consultations that may have long waiting periods.

  DO NOT lose time because of misunderstandings, denial and non-compliance of caregivers.
- Develop an early intervention plan. The plan must include the most important component of early intervention: a rich care and learning environment at home that the family can provide every day.
- Provide recommendations on supporting the child's development in the home, based on the child's current abilities and needs. Age-specific recommendations may not be appropriate for all children.

Early intervention services may include:

- Home-based early intervention to improve functioning, activities and participation in daily life, e.g. home visits
- Nutritional support, e.g. feeding tubes, swallowing therapy or special diets
- Speech therapy
- Nursing care services
- Assistive devices: orthoses and prosthetics
- Rehabilitative therapies (see rehabilitation below)
- Provision of hearing aids and glasses
- Special education

- Inclusive preschool education and schooling
- Family education
- Psychological and psychiatric services for child and family
- Social and financial support services
- Transportation services.

Rehabilitation

▶ Organize rehabilitation services, if needed, based on the child's needs and age that will help the child or adolescent to:

  — Carry out daily activities independently, e.g. eating, dressing, toileting, bathing, taking care of the body.

  — Move around the home and in the community, e.g. to play, go to school or work.

  — Participate in society on an equal basis with others, e.g. make friends, play, study, work, participate in community events.

Rehabilitation interventions may include:

- Physiotherapy, occupational therapy, speech therapy, orientation and mobility training
- Assistive devices and technologies, such as prostheses, orthoses, wheelchairs, hearing aids.

Adolescence

When a child with a developmental difficulty grows up, the needs of the child and caregivers may change in every stage of the child's life. It is important that the child and parents are followed up appropriately. Identify any additional support or services needed.

For more information on special considerations for managing chronic conditions in adolescence, see p. 707.

7.3 Autism spectrum disorder

Autism spectrum disorder (ASD) is a lifelong developmental disability characterized by persistent deficits in social communication and social interaction and restricted, repetitive patterns of behaviour, interests or activities. The spectrum of the condition is large. While some children with autism can live independently, others have severe disabilities and require lifelong care and support. One form of ASD is Asperger syndrome, characterized by no or few problems with language or cognition.

Given the potential long-term impact of the disease and the relative effectiveness of early specialized treatment, it is important to diagnose the condition as early as possible, preferably before the age of three. Primary health care providers play a crucial role in identifying and referring affected children as soon as possible.

Signs and symptoms

Table 96. Signs and symptoms of autism spectrum disorder by age

Age	Signs and symptoms of autism spectrum disorder
6–12 months	• Limited or no eye contact • Reduced sharing of sounds, smiles or facial expressions • Diminished, atypical, or no babbling or gesturing, e.g. pointing, reaching, waving bye-bye • Limited response to name when called.
9–12 months	• Emerging repetitive behaviours, e.g. spinning or lining up objects • Unusual play, e.g. intense exploration of toys.
12–18 months	• No single words • Lack of pretend play • Limited initiating, responding, sharing of interests.
15–24 months	• Diminished, atypical, or no spontaneous or meaningful two-word phrases.
Preschool age	• Reduced use of gestures, speech, body language, facial expressions and eye contact • Repetitive movements, e.g. hand flapping, body rocking, spinning, finger flicking • Repetitive play, e.g. opening and closing doors • Reduced use of language: prefers single words, although able to speak in sentences • Non-speech-like vocalizations, odd or flat intonation • Frequent repetition of words or phrases (echolalia) • Reference to self by name or “you” or “she/he” beyond 3 years • Reduced interest in others; initiation of social play with others; imitation of others’ actions; enjoyment of situations liked by most children (e.g. birthday parties) • Extreme emotional reaction to change or new situations, insistence on things being the same.

Age	Signs and symptoms of autism spectrum disorder
Primary school age	• Limited spoken language, monotonous, repetitive • Talking at others rather than with others • Rude or inappropriate response to others • Rigid expectation that other children should adhere to rules of play • Reduced response to name being called, other persons' facial expressions or feelings • Reduced interest in people, including children of the same age • Reduced flexible imaginative play or creativity.

Note: high-functioning forms of ASD can be undiagnosed until they are provoked by stress and the challenges of adolescence or young adulthood.

Management

- Refer children with suspected ASD to a specialist (e.g. specialized psychologist, developmental paediatrician or child psychiatrist) for confirmation of diagnosis, further assessment and advice on a management plan.
- Provide support and advice to parents.
- Monitor nutritional status (dietary habits, type of foods consumed or avoided) and assess for symptoms of micronutrient deficiencies, as children with ASD may have selective eating patterns.
- Liaise with teachers and other school staff.
- Link with other available resources in the community.

DO NOT prescribe pharmacological treatment without specialist advice.

See p. 567 for more information on how to support children with developmental difficulties and their families.

7.4 Attention deficit hyperactivity disorder

Attention deficit hyperactivity disorder (ADHD) is a persistent pattern of inattention or hyperactivity-impulsivity that interferes with functioning or development. ADHD usually begins before 5 years of age, but some may only develop symptoms during adolescence. Typical symptoms are difficult to identify as they overlap with normal behaviour. It is however important to suspect ADHD, as children may be mislabelled as naughty and be blamed and punished for behaviour that they are not able to control.

History

- Excessive inattention: absent-mindedness, not following the flow of information at preschool or school
- Unable to concentrate on a task for more than a few minutes, switching to other activities, wandering off task, lacking persistence
- Often losing personal belongings
- Excessive overactivity: running around, difficulty remaining seated, talkativeness, moving restlessly, fidgeting or tapping
- Excessive impulsivity: often doing things without thinking that have a harmful potential (experimenting with drugs, sexual risk-taking).

Management

- Refer children with suspected ADHD to a specialist (e.g. specialized psychologist, developmental paediatrician or child psychiatrist) to confirm the diagnosis. The specialist may consider initiation of pharmacological treatment (e.g. methylphenidate) in children aged 6 years and above with a diagnosis of ADHD in whom other treatment approaches have failed.
- Follow up on specialist treatment plan and monitor for common side-effects of the drug under the guidance of the specialist.

DO NOT prescribe medication without specialist consultation

- Explain the nature of the condition to caregivers and give advice on how to assist their child in taking control, e.g. reminders, making sure that tasks and homework are done.
- Liaise with teachers and school staff. Make sure they understand that the child or adolescent's behaviour is linked to a condition. Give advice on how to adapt the educational approach:
  - — Provide opportunities for the child or adolescent to use their skills and strengths
  - — Ask the child to sit at the front of the class
  - — Give the child extra time to understand and complete assignments
  - — Divide long assignments into smaller units and assign one piece at a time
  - — Provide extra praise for effort and rewards for achievements.
- Monitor for symptoms of emotional problems (p. 645) that can develop over time.

- Consider behavioural interventions (p. 647).
- Manage and reduce stress factors and strengthen social supports.
- If the child has been prescribed stimulant or non-stimulant medication:
  - — Record prescription and administration details
  - — Monitor potential for misuse and diversion
  - — Liaise with a specialist if you observe medication side-effects or think the dosage is inappropriate
  - — After one year of treatment: consult specialist again regarding continuation of the medication.

See p. 567 for more information on how to support children with developmental difficulties and their families.

7.5 Down syndrome

Down syndrome (trisomy 21) is the most common genetic syndrome. It is due to extra genetic material from chromosome 21 and associated with increased maternal age. Down syndrome causes a distinct facial appearance and, in most cases, early developmental problems and intellectual disability. It may be associated with thyroid or heart disease.

Diagnosis

Prenatal diagnosis is available in the first trimester with ultrasound of fetal nuchal translucency and testing of placental hormone levels. Definitive testing is performed by chorionic villus sampling or amniocentesis for genetic testing.

Postnatal diagnosis is based on genetic testing. Babies may display characteristic features suggestive of Down syndrome:

- Short and round skull with flat occipital bone
- Medially downward slanting eyes with narrow palpebral fissures
- Wide space between eyes (hypertelorism)
- Epicanthic skin folds
- Single palmar crease (four-finger crease)
- Wide space between first and second toes
- Small ears
- Small mouth with large tongue (macroglossia)
- Muscular hypotonia and lax ligaments.

Other signs:

- Poor feeding
- Atlanto-axial instability (after infancy)
- Delayed developmental milestones (p. 62)
- Intellectual disability in varying degrees.

Management

Care coordination

- Refer children with suspected Down syndrome to a specialist for diagnosis.
- Coordinate care with a multidisciplinary team of therapists and special educators to support development, e.g. physiotherapy, speech and language therapy, occupational therapy.
- Initiate early intervention programmes (p. 567).

Counselling and support

- Help parents to adjust to their child's condition. Reassure them that although the diagnosis may be a shock at first, their child can live a long and fulfilling life.
- Direct parents to information specific to their child's condition, e.g. associations and websites.

Immunization

- Provide immunizations as per local routine immunization schedule (p. 69).

Monitoring

- Monitor for associated problems or conditions:
  - Hearing and vision problems (p. 80)
  - Duodenal atresia
  - Hypogonadism in male patients
  - Congenital heart disease (p. 159)
  - Hypothyroidism
  - Coeliac disease
  - Acute myeloid leukaemia
  - Immunodeficiency (bacterial or fungal infections)
  - Psoriasis and eczema.

See p. 567 for more information on how to support children with developmental difficulties and their families.

7.6 Neural tube defects

Neural tube defects result from abnormal closure of the embryonic neural tube between 22 and 28 days after conception. Causes include genetic and maternal factors such as folic acid deficiency, obesity, diabetes, first-trimester fever and antiepileptic drugs.

Types of neural tube defects may affect:

- **Brain structures:**
  - — Anencephaly: complete or partial absence of the brain
  - — Encephalocele: brain and meninges herniate through the skull.
- **Structures of the spinal cord:**
  - — Spina bifida occulta: mildest form, no or only mild signs, e.g. swelling on the back, hairy areas, dimple or a dark spot, but no opening or sac on the back. The defect is covered by skin.
  - — Meningocele: protruding fluid-filled sac containing meninges and cerebrospinal fluid, but no spinal cord.
  - — Myelomeningocele (spina bifida): cystic protrusion containing spinal cord, nerves, or both. This most severe form is accompanied by problems with walking and bladder or bowel control, hydrocephalus, tethered spinal cord, i.e. the spinal cord is abnormally attached to surrounding tissue.

Diagnosis

- Antenatal combined test (ultrasound with maternal alpha-fetoprotein)
- Postpartum: defect with exposure of neural tissue.

Management

Management depends on the type of defect and usually requires a multidisciplinary approach. The aim is to enable and support a child to live life to the fullest, within the child's own capabilities.

Care coordination

- Refer children to a specialist for diagnosis and development of a management plan.

- Cooperate with specialists (e.g neurodevelopmental paediatricians), rehabilitation team and specialist services (neurosurgery, orthopaedics, nephrology or urology) as necessary.

Counselling and support

- Provide advice to parents and teachers on how to create opportunities for improved participation.
- Help parents to adjust to their child's condition.
- Direct parents to information specific to their child's condition, e.g. patient associations and websites.

Immunization

- Provide immunizations as per local routine immunization schedule (p. 69).

Monitoring

- Monitor closely for comorbidities and complications and manage accordingly (Table 97).
- If the neurological status deteriorates or asymmetrical neurological signs emerge, refer urgently.

Table 97. Management of complications and comorbidities

Problem	Management
Hydrocephalus (often due to Chiari type 2 malformation)	▶ Monitor for signs of raised intracranial pressure: — Irritability — Sleepiness — Bulging or pulsing fontanelle — Vomiting, poor feeding. ▶ Measure head circumference weekly in the first month, then monthly ▶ Refer for regular cranial ultrasounds ▶ If hydrocephalus is confirmed, refer urgently to surgery for ventriculoperitoneal shunt ▶ If suspicion of Chiari type 2 malformation, refer urgently.

Problem	Management
Cord-tethering syndrome	▶ Monitor for: — Lower back pain — Motor deficits of the lower limb, e.g. muscle weakness, spasticity, abnormal reflexes — Sensory disturbances in the lower limbs — Bladder or bowel dysfunction. ▶ Refer for surgery.
Bladder or bowel dysfunction (e.g. incontinence)	▶ Treat urinary tract infections, if present (p. 356). ▶ If there are signs of urosepsis (p. 226), refer urgently. ▶ Assess need for nappies or intermittent catheterization. ▶ Refer to urologist for conduit procedures, if needed.
Kyphoscoliosis, impaired movement and ability to walk	▶ Monitor for complications: — Cardiorespiratory problems — Hip dislocation — Knee contractures — Fractures — Tibial torsion — Foot deformities. ▶ Prescribe assistive devices such as braces, rigid orthoses or a wheelchair, if needed. ▶ Refer to orthopaedic surgeon and physiotherapist for spasticity management, if needed. ▶ If rapid progression of a scoliosis, refer urgently.
Trophic skin lesions	▶ Frequently inspect at-risk areas such as pelvis and feet for pressure ulcers. ▶ Refer to dermatologist, if needed.
Growth problems	▶ Monitor growth (p. 20) and puberty (p. 674). ▶ Provide nutritional counselling. ▶ Refer to dietitian, if needed.
Latex allergy	▶ Advise to avoid latex articles and to use silicone or vinyl instead.
Seizures (p. 469)	▶ Monitor for possible underlying cause of seizures e.g. shunt malfunction or infection. ▶ Ensure seizure control. ▶ Refer to neurologist, if needed.

Problem	Management
Vision, hearing	▶ Monitor vision and hearing routinely. ▶ Refer to audiologist and ophthalmologist for hearing aids or glasses, if needed.
Cognitive impairment	▶ Ensure early recognition and intervention, individualized learning plans. ▶ Refer to psychologist, if needed.
Psychosocial issues	▶ Address poor self-image and educational and occupational exclusion. ▶ Provide puberty and sex education to adolescents (p. 678). ▶ Refer to psychologist or social worker, if needed.

See p. 567 for more information on how to support children with developmental difficulties and their families.

7.7 Cerebral palsy

Cerebral palsies are a group of disorders that affect movement and muscle tone or posture which are caused by disturbances in the developing fetal or infant brain. Cerebral palsies may be bi- or unilateral and can be classified as spastic (increased tone), dyskinetic (variable tone, involuntary and uncontrolled movements) or ataxic.

Diagnosis

Cerebral palsy can be diagnosed in the first year(s) of life but needs repeated assessment over time to establish that it is neither transient nor worsening. Early identification of cerebral palsy helps to prevent or reduce complications.

History

Assess risk factors:

- History of preterm delivery or birth complications (obstructed labour)
- Birth < 32 weeks of gestational age or birth weight < 1500 g
- Neonatal seizures, encephalopathy, severe hyperbilirubinaemia or hypoglycaemia.

Examination

Assess for:

- Difficulty with movement (impaired gross motor function), maintaining balance and posture, e.g. truncal hypotonia (p. 480), and poor head control in the first months of life: see Table 98 to assess severity in children aged 6 months to 2 years
- Accompanying epilepsy, secondary musculoskeletal problems and impaired sensation, vision, cognition, communication or behaviour.

DO NOT misdiagnose transitory neurological phenomena or a single missed milestone at a single timepoint as "early or likely cerebral palsy".

DO NOT label a child as having cerebral palsy because of a low APGAR at birth.

Table 98. Gross motor function classification system (GMFCS)

GMFCS level	Features in children aged 6 months to 2 years
Level I	• Moves in and out of sitting, floor sitting with both hands free to manipulate objects • Crawls on hands and knees, pulls to stand and takes steps holding on to furniture • Walks between 18 months and 2 years of age without the need for any assistive mobility device.
Level II	• Maintains floor sitting but may need to use hands to maintain balance • Creeps on stomach or crawls on hands and knees. • May pull to stand and take steps holding on to furniture.
Level III	• Maintains floor sitting when lower back is supported • Rolls and creeps forward on stomach.
Level IV	• Has head control but trunk support is required for floor sitting • Can roll to supine and may roll to prone.
Level V	• Physical impairments limit voluntary control of movement • Unable to maintain antigravity head and trunk postures in prone and sitting • Requires adult assistance to roll.

Management

The clinical profile of every child with cerebral palsy is unique. A personalized approach is needed to provide the child with the best possible quality of life and opportunity to live life to the fullest.

Care coordination

- Refer children with suspected cerebral palsy to a specialist for confirmation of diagnosis, further assessment (cranial ultrasound or brain MRI) and development of a management plan.
- Cooperate with the specialist, multidisciplinary team (including physiotherapy, postural management and orthosis, speech and occupational therapy) and caregivers to plan interventions and report progress.
- Refer to physiotherapy for the management of the motor problems. Follow the principle "Do no harm", especially when it comes to painful procedures.

Counselling and support

Good communication with parents regarding diagnosis and realistic expectations is key:

- Understand the beliefs and resources of the parents and their motivation for "dos and don'ts".
- Communicate realistic developmental and therapeutic goals.
- Encourage involvement of the family and educate parents to support the child's development.

Routine health care

- Provide care for intercurrent illnesses and other possible chronic conditions.
- Provide immunization (cerebral palsy is NOT a contraindication for vaccinations).
- Provide feeding and nutrition counselling.
- Monitor growth, development, behaviour, mental health, school and social performance.
- Ensure regular hearing and vision assessment and dental review.

Monitoring

- Follow up regularly (every 3 months).
- Monitor progress of the motor development at each visit, supported by videos at home.
- Monitor and identify typical problems in children with cerebral palsy and manage accordingly (Table 99).

Table 99. Management of common problems in children with cerebral palsy

Problem	Management
Vision Strabismus, refractive errors, optic nerve dysplasia, visual field defects, retinopathies	▶ Monitor regularly. ▶ Refer to ophthalmologist for glasses, eye patching, strabismus surgery, if needed.
Hearing Conductive defects, sensorineural hearing loss	▶ Monitor regularly. ▶ Refer to otolaryngologist or audiologist for hearing aids, if needed.
Communication Central language disorders, bulbar palsy	▶ Refer to speech therapist for alternative and augmentative communication methods.
Feeding Bulbar palsy, gastroesophageal reflux	▶ Monitor growth (p. 20). ▶ Consider nasogastric tube, gastrostomy feeding, antireflux medications. ▶ Refer to dietitian, if needed.
Epilepsy Seizures	▶ Refer for an electroencephalogram. ▶ Consider antiepileptic medications. ▶ Refer to neurologist, if needed.
Cognition Learning difficulties	▶ Ensure early recognition and intervention. ▶ Refer to psychologist for individualized learning plans, if needed.
Behaviour Sleep problems, frequent crying	▶ Assess for and manage pain (p. 506). ▶ Consider behavioural techniques (p. 647). ▶ Refer to psychologist, if needed.

See p. 567 for more information on how to support children with developmental difficulties and their families.

7.8 Fetal alcohol spectrum disorder

Fetal alcohol spectrum disorder is characterized by prenatal growth deficiency, developmental problems and craniofacial abnormalities caused by prenatal alcohol exposure following maternal consumption of alcohol during pregnancy. Binge drinking in early pregnancy can lead to severe organ malformation and spontaneous abortion; drinking in late pregnancy can impact growth and development of the brain.

Diagnosis

Diagnosis may be difficult, especially if alcohol consumption is concealed. Prenatal alcohol exposure can be assessed by asking the mother about consumption before and during pregnancy (reliable answers require confidentiality and trust). Developmental and at times behavioural difficulties can emerge through childhood and may not be evident in infancy.

Newborns

- Irritability and marked startle reflexes (neonatal withdrawal syndrome)
- Symmetrical growth retardation in newborn period
- Small palpebral fissures
- Smooth philtrum (skin between the base of the nose and the top of the upper lip is flat and smooth without any ridge in the centre of the upper lip)
- Thin upper lip
- Possible microcephaly
- Postnatal slowing of head growth
- Poor feeding and slow weight gain
- Renal and cardiac malformations.

Facial features of children with fetal alcohol spectrum disorder: small palperal fissures, smooth philtrum and thin upper lip.

Infants and children

- Often no apparent characteristic dysmorphism
- Developmental difficulties (p. 565), learning difficulties
- Behavioural difficulties (p. 645).

Management

- Refer to specialist for further assessment and confirmation of diagnosis.
- Provide routine health care and immunizations as per local routine immunization schedule (p. 69).

Monitoring

- Monitor for:
  - Vision and hearing problems
  - Heart problems (p. 584) and kidney problems (p. 586)
  - Signs of child maltreatment and neglect (p. 637)
  - Developmental difficulties (p. 565) due to adverse life events (maltreatment, multiple placements, neglect) and delayed diagnosis or misdiagnosis
  - Emotional and behavioural problems (p. 645).

Support of parents or caregivers

- Provide support to parents.
- Establish a rapport with caregivers and encourage their active engagement and participation in the provision of care, whenever safe and appropriate.
- Adopt a nonjudgmental, respectful attitude towards caregivers, and avoid blaming or stigmatizing them.
- Provide caregivers with the skills for positive parenting, coping and establishing a healthy family life.
- Facilitate access to psychological services for the caregivers or family, if needed.

Protect and ensure the child or adolescent's safety

- Assess if there are any concerns for the child's safety and well-being and if immediate protection is needed in the child's best interest.
- Facilitate access to psychological services for provision of counselling, social services, including child protection services and legal services, if needed and available.
- Refer mother for treatment if ongoing alcoholism.

See Management of developmental difficulties, p. 567, for more information on how to support the child and the family.

7.9 Heart disease

Children with symptomatic congenital or acquired heart disease including those with rheumatic heart disease have complex health care needs.

Congenital heart disease or defects are the most common types of birth defects and occur in 1% of all newborns. Survival and the proportion of children reaching adult life depend on the defect and its potential treatment, and are increasing thanks to medical and surgical progress. At every visit, pay special attention to the following:

History

- Any new complaint or worsening symptoms
- Fatigue, exercise tolerance
- Psychological impact of the condition, especially when heart disease in adolescents limits normal life, e.g. poor exercise tolerance
- Nutrition and lifestyle habits.

Examination

- Vital signs including heart rate, oxygen saturation and blood pressure
- Growth (p. 20) and development (p. 61)
- Pallor
- Heart murmur (p. 325), any change?
- Cyanosis
- Signs of heart failure (p. 328).

Management

See p. 159 for urgent management of serious congenital heart disease in newborns.

Care coordination

- Refer all children with congenital or acquired heart disease to a specialist to set up a treatment plan for the child, depending on the type of defect.
- Coordinate continuous care with the specialist and follow specialist advice regarding medication, endocarditis prophylaxis (p. 585), exercise restrictions and need for investigations and surgical procedures.

Counselling and support

- Counsel on the importance of a healthy lifestyle to reduce the risk of comorbidities, e.g. maintaining a healthy weight, nutrition, physical activity, avoiding smoking and other high-risk behaviours.
- Assess the need for parental and social support.

Routine health care

- Monitor growth, medication compliance, development, behaviour, mental health, school and social performance.
- Provide care for possible other chronic conditions (heart disease is often associated with other congenital anomalies).
- Provide immunizations as per local routine immunization schedule (p. 69). Consider additional vaccines such as influenza vaccine depending on type and severity of heart disease and comorbidities, e.g. asplenia.

Prevention of infective endocarditis

Children with heart valve damage (including rheumatic heart disease) are at **high risk of bacterial endocarditis**, especially those with:

- A previous episode of infective endocarditis
- Any type of unrepaired cyanotic congenital heart disease
- Any type of congenital heart disease repaired with prosthetic material for up to 6 months after the procedure or lifelong for residual heart disease.

- Give antibiotic prophylaxis when a high-risk procedure (e.g. dental procedures) is scheduled 30–60 minutes before the procedure: single-dose amoxicillin orally or ampicillin IV at 50 mg/kg (max. 2 g) or cefazolin or ceftriaxone IV at 50 mg/kg (max. 1 g). If allergic to penicillin: clindamycin 20 mg/kg orally or IV (max. 600 mg).

Dental and skin care

The bacteria causing endocarditis can spread from the mouth so good dental hygiene is important to minimize this risk:

- Ensure regular dental review, twice a year for high-risk patients (see above) or once a year for moderate-risk patients (bicuspid aortic valve, mitral valve prolapse, calcific aortic stenosis).
- Counsel on the importance of dental and skin hygiene:
  - Keep good dental hygiene. Go to the dentist once or twice yearly as advised.

- If you have a wound, apply disinfectant and keep it clean.
- Do not take antibiotics if not prescribed by a doctor.
- Avoid piercings and tattoos.

Secondary antibiotic prophylaxis for rheumatic heart disease

Children with rheumatic heart disease or those who had an episode of acute rheumatic fever (p. 241) should receive an antibiotic to reduce the risk of future episodes of acute rheumatic fever and disease progression:

- Give IM benzathine penicillin G (1.2 million IU for children > 30 kg, 0.6 million IU for children < 30 kg) every 4 weeks.
- Duration of treatment after last episode of acute rheumatic fever:
  - Without carditis: for five years or until 21 years of age
  - With carditis but no residual heart disease: for ten years or until 21 years of age
  - With carditis and residual heart disease: for ten years or until 40 years of age or lifelong.

Follow-up

The frequency of follow-up visits depends on the type of defect and severity of heart disease. Avoid unnecessarily close follow-up and life restrictions in children with congenital heart defects which are simple or have been repaired successfully. These children are no longer at risk and should be considered and treated as healthy children. More complex congenital heart defects may require multiple surgical procedures and more regular follow-up.

7.10 Chronic kidney disease

Chronic kidney disease is an abnormality of the structure or function of the kidneys lasting for more than 3 months which has implications for general health. Chronic kidney disease usually gets worse over time and leads to end-stage kidney disease.

History and examination

Presentation is often mild and highly variable:

- Faltering growth
- Fatigue
- Headache
- Anorexia

- Nausea
- Vomiting
- Pallor
- Rickets
- Oedema
- Hypertension.

Adolescents may present with:

- Delayed puberty
- Anaemia.

Management

Management of chronic kidney disease requires a multidisciplinary approach and continuous care. The aim is to delay disease progression and manage complications. In advanced stages of the disease, substitutive treatment including renal dialysis or kidney transplant may be needed.

- Coordinate care with a specialist and follow the specialist's treatment plan.
- Provide counselling on nutrition, appropriate physical activity and supplements (may be needed to maintain levels of electrolytes).
- Provide immunizations as per local routine immunization schedule (p. 69).
- Monitor for and manage complications such as hypertension (p. 342) or anaemia (p. 406).

7.11 Asthma

Asthma is a chronic inflammatory condition with reversible airway obstruction and bronchospasm. Asthma is the most common chronic disease of childhood. Symptoms commence in early childhood in up to half of all people with asthma.

History

- Recurrent and frequent episodes of > 1 of the following symptoms (vary over time and in intensity, often worse at night):
  - — Wheezing (ask the caregiver to film an episode, which can help to confirm the presence of wheeze)
  - — Chest tightness

  - Non-productive cough
  - Difficult breathing or shortness of breath
- Absence of apparent respiratory infection
- Symptom triggers: exercise, laughing or crying, exposure to tobacco smoke or air pollution, allergens (house dust mites, pollens), viral infections (common cold), stress
- Reduced activity: child runs, plays, laughs less hard than other children, tires earlier during walks and wants to be carried
- History of allergic rhinitis, atopic dermatitis or food allergy
- Family history of asthma, allergy, atopy, allergen sensitization in first-degree relatives.

Examination

Look for:

- Hyperinflation of the chest
- Lower chest wall indrawing
- Use of accessory muscles for respiration (feel the neck muscles)
- Prolonged expiration with audible wheeze on auscultation
- Silent chest (reduced/no air intake) in life-threatening obstruction
- Increased respiratory rate
- Increased pulse rate
- Oxygen saturation.

Diagnosis

Diagnosis of asthma in children ≤ 5 years

It is difficult to make a diagnosis in young children. Recurrent wheezing and cough due to viral respiratory infections are common in young children without asthma and lung function assessment with a reversibility test is not routinely possible. Diagnosis of asthma can be based on careful clinical assessment, probability (Table 100) and the following factors:

- Typical symptom pattern and risk factors (see history)
- A therapeutic trial with low-dose inhaled corticosteroid, and as-needed short-acting beta-agonists (SABA), e.g. salbutamol: improvement over 2–3 months of treatment and worsening after cessation
- Exclusion of other diagnoses (see differential diagnosis).

Table 100. Probability of asthma diagnosis in children ≤ 5 years

	Few have asthma	Some have asthma	Most have asthma
Days symptomatic during upper respiratory tract infections	< 10 days	< 10 days	> 10 days
Number of episodes per year	2–3	> 3 or severe episodes, night worsening	
Symptoms between episodes	No	Yes	Yes
History of other allergies or family history of asthma	No	No	Yes

Diagnosis of asthma in children ≥ 6 years

- Typical pattern of symptoms and risk factors (see history)
- Lung function evaluation (spirometry/peak expiratory flow (PEF)) with reversibility test to document at least once:
  - FEV1/FVC ratio below the limit of normal (FEV1: forced expiratory volume in the first second; FVC: forced vital capacity)
  - Excessive variability in lung function, e.g. an increase in lung function (FEV1 increases from baseline by > 12% of the predicted value) after inhaling a bronchodilator.
- Consider referral for bronchial provocation test to assess airway hyperresponsiveness and skin prick (allergy) test.

Differential diagnosis

See Cough and difficulty breathing, p. 177, Conditions presenting with wheeze, p. 191, and Chronic cough, p. 202.

Management of asthma exacerbation

- Assess severity of exacerbation (Table 101).

DO NOT sedate. Calm the child and parents.

- Ensure a comfortable position (sitting is usually preferred to lying)

Table 101. Assessment of severity of asthma exacerbation

Severity of exacerbation	Symptoms	Management
Life-threatening	• Drowsy, confused, silent chest on auscultation	**Refer immediately to hospital.** While waiting for transfer give: • Salbutamol • Prednisolone • Oxygen • Consider ipratropium bromide See dosages below.
Severe Children ≥ 6 years	• Sits hunched forward, agitated, talks in words • Respiratory rate > 30/min • Pulse rate > 120 bpm • SpO_2 on room air < 90%	
Children ≤ 5 years	• Unable to speak or drink • Central cyanosis • Respiratory rate > 40/min • Pulse rate > 180 bpm (0–3 years), > 150 (4–5 years) • SpO_2 on room air < 92%	
Severity of exacerbation	**Symptoms**	**Management**
Mild or moderate Children ≥ 6 years	• Normal mental state • Talks in phrases, prefers sitting to lying • Respiratory rate <30/min • Pulse rate 100–120 bpm • SpO_2 on room air 90–95%	Provide treatment: • Salbutamol • Oxygen • Prednisolone (if ≥ 6 years, consider in ≤ 5 years) See dosages below. **Monitor closely for 1–2 hours**
Children ≤ 5 years	• Normal mental state • Breathless, agitated • Respiratory rate < 40/min • Pulse rate ≤ 180 bpm (0–3 years); ≤ 150 (4–5 years) • SpO_2 on room air ≥ 92%	

Management of life-threatening or severe exacerbation

! Life-threatening and severe asthma exacerbation are an EMERGENCY.

Refer immediately to hospital. While waiting for transfer:

- Give salbutamol every 20 minutes for the first hour: 6–10 puffs (100 µg/puff) by MDI with spacer and interface (Table 102, p. 595) or nebulized (with oxygen) 2.5 mg if < 20 kg or 5 mg if ≥ 20 kg.
- Give prednisolone orally 1–2 mg/kg/day (max. 20 mg if < 2 years; 30 mg if 2–5 years, 40 mg if 6–11 years, 50 mg if > 12 years) or methylprednisolone IM 2 mg/kg/dose (max. 60 mg).
- Give controlled oxygen. Target saturation 94–98%.
- Consider ipratropium bromide 160 µg by MDI with spacer and interface (Table 102, p. 595) or nebulized (with salbutamol) 250 µg if < 30 kg or 500 µg if ≥ 30 kg.

Management of mild or moderate exacerbation

- Give salbutamol every 20 minutes for the first hour, if needed: 2–10 puffs (100 µg/puff) by MDI with spacer and interface (Table 102, p. 595) or nebulized (with oxygen) 2.5 mg if < 20 kg or 5 mg if ≥ 20 kg.
- Give prednisolone orally to children ≥ 6 years. Consider in children ≤ 5 years if symptoms recur within 3–4 hours.
- Give controlled oxygen. Target saturation 94–98%.
- Monitor closely for 1–2 hours and assess response:
  - **Good response** (symptoms improved, SpO_2 > 94% on room air):
    - Child can go home
    - Continue salbutamol as needed and prednisolone for 3–5 days, if started (as above)
    - Consider need for controller or step up regular controller
    - Counsel on inhaler technique (p. 596)
    - Provide written action plan (see Annex 8) and discuss how to recognize danger signs and what to do.

— **Poor response** to salbutamol repeated 3 times over 1–2 hours or worsening of symptoms or signs of severe exacerbation:
  - **Refer** the child. While waiting for transfer provide treatment as for severe asthma exacerbation (see above).

Follow-up

- Arrange follow-up within 1–2 days to review symptoms (p. 597) and to determine whether the exacerbation is resolving.
- Check and correct modifiable risk factors (see below).
- Discuss action plan (Annex 8): any modifications needed?
- Assess if prednisolone should be continued, reduce salbutamol as needed and continue controller medication on higher dose for short term (1–2 weeks) or long term (3 months), depending on cause of exacerbation.

Long-term management of asthma

Asthma is a chronic condition that requires:

- Lifelong treatment and regular follow-up
- Cooperation with a specialist for optimal management
- Care coordination by the primary health care provider.

Management of modifiable risk factors for exacerbations

- Assess and manage modifiable risk factors for exacerbations:
  — Counsel to avoid exposure to tobacco smoke: encourage family members to cease smoking
  — In case of overweight or obesity (p. 517), counsel on strategies to reduce weight (p. 519)
  — Address psychological problems and counsel on how to deal with emotional stress
  — In case of food allergy, counsel on avoidance of food
  — Counsel on avoidance of allergen exposure.
- Assess and manage comorbidities, e.g. allergic rhinitis, eczema.

Pharmacological treatment of asthma is based on a stepwise approach. Asthma medication (see Annex 4 for dosages) consists of:

- **Controller** medication for daily long-term use to prevent exacerbations and to control interval symptoms:

  - — Inhaled corticosteroids (ICS) such as budesonide *or*
  - — Inhaled corticosteroids (ICS) + long-acting beta$_2$ agonist (LABA) such as budesonide-formoterol
  - — Add-on treatment, e.g. tiotropium, anti-IgE (needs prescription by specialist).
- **Reliever** medication for as-needed, quick symptom relief:
  - — Short-acting beta$_2$ agonist (SABA) such as salbutamol *or*
  - — Low-dose inhaled corticosteroids (ICS) + long-acting beta$_2$ agonist (LABA) such as budesonide-formoterol.

DO NOT give LABA without ICS.

- Prescribe reliever medication as needed every 4–6 hours until symptoms disappear in **all** children with intermittent or episodic wheezing episodes of any severity.
- Choose appropriate initial controller medication in children ≥ 6 years with a diagnosis of asthma (p. 594). In children ≤ 5 years, consider controller medication if history and symptoms suggest asthma diagnosis and respiratory symptoms are uncontrolled (Table 100, p. 589) or wheezing episodes are frequent (e.g. ≥ 3 in a season).
- After initiating treatment, review response and assess whether treatment should be stepped up or down (p. 597).
- Choose an age-appropriate inhaler device and counsel on how to use it (p. 595).
- Provide a written asthma action plan for the patient and caregivers (see example of an action plan on p. 858). Discuss how to recognize danger signs and when to seek treatment urgently.

DO NOT routinely give antibiotics: they may be indicated for persistent fever and other signs of pneumonia (p. 184).

Selecting initial controller treatment

For children ≤ 5 years

▶ Consider this step if:

Infrequent wheezing episodes, no or few interval symptoms	Wheezing episodes requiring SABA occur frequently (e.g. > 3/year)	Asthma diagnosis, asthma not well controlled on low-dose ICS	Asthma not well controlled on double ICS
Step 1	Step 2	Step 3	Step 4
–	Daily low-dose ICS	Double low-dose ICS	Continue controller medication + refer to specialist
SABA as needed	+ SABA as needed		

For children ≥ 6 years

▶ Start here if:

Symptoms < 2/month	Symptoms ≥ 2/month but less than daily	Symptoms most days, or night-waking ≥ 1/week	Symptoms most days, or night-waking ≥ 1/week + low lung function	
Step 1	Step 2	Step 3	Step 4	Step 5
Children aged 6–11 years				
–	Daily low-dose ICS	Medium-dose ICS or low-dose ICS-LABA	Medium-dose ICS-LABA: Refer to specialist	Refer for phenotypic assessment ± add-on therapy
SABA as needed	+ SABA as needed			
Adolescents ≥ 12 years				
As-needed low-dose ICS-formoterol	Daily low-dose ICS or as-needed low-dose ICS-formoterol	Low-dose ICS-LABA	Medium-dose ICS-LABA	High-dose ICS-LABA: Refer for phenotypic assessment ± add-on therapy
+ Low-dose ICS-formoterol as needed				

Types and use of inhalers for asthma treatment

Table 102. Choice of age-appropriate inhaler device

Age	Preferred device	Alternative device
0–3 years	Metered dose inhaler (MDI) + spacer with face mask  *Giving salbutamol by MDI with a spacer device and a well-sealing face mask to younger children who cannot reliably seal their lips around a mouthpiece.*	Nebulizer with face mask
4–5 years	MDI + spacer with mouthpiece 	MDI + spacer with face mask or nebulizer with face mask  *Nebulizer with face mask*
≥ 6 years	MDI (+ spacer with mouthpiece, if needed depending on age) 	MDI + spacer with face mask or nebulizer with face mask *or* breath-actuated dry powder inhaler (DPI)

Types of inhaler devices

Metered-dose inhaler (MDI) – with or without spacer

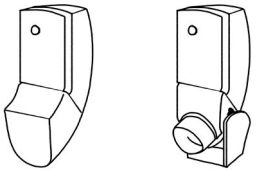
Standard MDIs contain a substance in an aerosol canister that propels the medication under pressure. It is necessary to press the canister to release a dose while inhaling.

MDI inhaler

- Prime the MDI before the first use, or if it has not been used for a while. Take the cap off the mouthpiece and shake the inhaler properly for five seconds before use. Place the mouthpiece between the lips to form a good seal. Ask the child to breathe out fully before inhaling. Press down the canister to release a dose while breathing in and inhale it. Hold breath for 10 seconds after inhaling. Then exhale slowly.

Breath-actuated dry powder inhaler (DPI) – no spacer required

These inhalers contain medication in a dry powder form. It is not necessary to press a canister to release a dose. The dose is triggered by inhaling forcefully through the mouthpiece. It is preferred for older children.



DPI inhalers

- Take the cap off the mouthpiece. Hold the inhaler upright and point the mouthpiece towards the mouth. Breathe out fully while holding the inhaler away from the mouth. Place the mouthpiece between the lips to form a good seal. Ask the child to breathe in steadily and deeply to get the powder into the lungs. Remove the inhaler from mouth. Hold breath for 10 seconds. Then exhale slowly.

Spacers

A spacer device can be used with MDIs for children of all ages to help them inhale the aerosol. If commercial devices are not available, a spacer device can be made from a 1-litre plastic bottle.

- Insert the inhaler mouthpiece into the end of the spacer device. Release two puffs of the inhaler into the spacer at a time. Then place the mouthpiece between the child's lips or the face mask over nose and mouth to form a good seal. Allow the child to breathe normally from the spacer for 4–5 breaths or for 10 seconds after each puff.

Monitoring

Review response and symptom control 1–3 months after the start of treatment and then every 3–12 months, depending on the level of control, adherence, skills and willingness to self-manage asthma.

- Measure FEV1 at diagnosis, after 3–6 months of controller treatment, then periodically for ongoing risk assessment.
- Assess symptom control (Table 103). Document response (symptom control, exacerbations, side-effects), child and parents' satisfaction, goals and preferences.

Table 103. Asthma symptom control assessment

Symptoms in last 4 weeks	Level of asthma symptom control		
	Well controlled	**Partly controlled**	**Uncontrolled**
Daytime symptoms > 2 x/week (> 1 x if ≤ 5 years)	None of these symptoms	1–2 of these symptoms	3–4 of these symptoms
Reliever medication needed > 2 x/week (> 1 x if ≤ 5 years)			
Night-waking due to asthma			
Activity limitation due to asthma			
Risk factors for exacerbations • Uncontrolled asthma symptoms • ≥ 1 severe exacerbations in previous year • Poor adherence or incorrect inhaler technique • Exposure: allergen exposure, pollution, tobacco smoke • Major psychological or socioeconomic problems for child or family.			

- Review and manage modifiable risk factors for exacerbations (p. 592). In addition:
  - — Counsel on appropriate inhaler technique (p. 596)
  - — In case of poor adherence, inquire for reasons and address them. Emphasize the importance of adherence.
- Adjust asthma medication to maintain good control:
  - — **Step up** if symptoms uncontrolled and persistent exacerbations despite 2–3 months of controller treatment; or

— **Step down** if symptoms well-controlled, stable lung function for ≥ 3 months and low risk for exacerbations (Table 103): choose an appropriate time (no respiratory infection, no travel) and document baseline status. Use available formulations to reduce ICS dose by 25–50% at 2–3-month intervals, but **do not** stop ICS.

▶ Refer for specialist advice if:

— Doubts about asthma diagnosis, e.g. symptoms not responding well to treatment

— Symptoms uncontrolled or exacerbations despite medium-dose ICS with correct inhaler technique and good adherence

— Suspected side-effects of treatment, e.g. growth delay.

7.12 Cystic fibrosis

Cystic fibrosis is the most common chronic, progressive genetic disease. Children and adolescents with cystic fibrosis require lifelong treatment and care. Although the disease is severely life-limiting, advances in the therapy of cystic fibrosis and a range of new drugs have led to significant improvements in quality of life and greater life expectancy. While most children are diagnosed at birth through newborn screening programmes, some get diagnosed later in infancy or childhood.

Signs and symptoms

Children and adolescents with cystic fibrosis have thick viscous secretions in the lung, pancreas, liver, intestine and reproductive tract, leading to multiple symptoms.

Onset of signs and symptoms is often in early infancy:

- Meconium ileus (p. 150)
- Congenital intestinal atresia
- Respiratory symptoms
- Failure to thrive.

In milder cases, signs and symptoms may develop in later childhood:

- Chronic and recurrent pulmonary disease: recurrent lower respiratory tract infections, chronic wet or productive cough
- Chronic sinus disease: chronic sinusitis, headache, nasal polyposis
- Pancreatic insufficiency: loose greasy stools, malabsorption, anaemia, vitamin deficiencies (A, D, E and K)

- Distal intestinal obstruction syndrome: abdominal pain and distension, flatulence, poor appetite
- Underweight (p. 512)
- Rectal prolapse
- Male infertility (almost all) and reduced female fertility
- Muscle pains and arthralgia
- Chronic liver disease
- Urinary stress incontinence
- Diabetes
- Reduced bone mineral density (e.g. osteoporosis).
- Arthritis
- Delayed puberty (p. 673)
- Kidney stones.

Management

Refer children and adolescents with suspected cystic fibrosis to a specialist to confirm the diagnosis through a sweat test and genetic testing.

Management of cystic fibrosis consists of treatment of lung disease, detection and management of complications, nutrition and psychological support. The aim is to prevent or limit symptoms and complications of the condition to achieve a good quality of life.

Care coordination

- Coordinate care with a specialist, physiotherapists, dietitians, psychologists, pharmacists and home care team.
- If there is evidence of lung disease refer to a specialist and follow the specialist treatment plan, which may include mucoactive agents (mucus thinners) such as hypertonic saline and antibiotics to prevent and treat pulmonary infections. In severe cases of cystic fibrosis, a lung transplant may be recommended.
- Refer to a physiotherapist, who can teach techniques to help keep the lungs and airways clear (airway clearance techniques).
- Refer to a dietitian, who can advise on how to avoid malnutrition and may recommend taking supplemental pancreatic enzyme capsules, extra

calories, and fat-soluble vitamins and minerals to support digestion, growth and nutrition.

- Prescribe other treatments such as pancreatic enzymes, nutritional supplements, insulin (in diabetes) according to specialist advice.
- Refer to a mental health specialist for psychological support, if needed.
- Provide palliative care and end-of-life support, if indicated (p. 655).

Monitoring

Provide regular monitoring and annual assessments (more frequently immediately after diagnosis). At each visit:

- Review history and treatment adherence.
- Perform a physical examination including growth monitoring (p. 20).
- Monitor for complications (see signs and symptoms).
- Assess for lung complications:
  - Measure oxygen saturation
  - Take respiratory secretion samples (sputum samples if possible, or a cough swab) for microbiological investigations
  - Refer for lung function testing with spirometry
  - Take blood tests annually, including white cell count, aspergillus serology and serum IgE
  - Refer annually for a chest X-ray.
- Assess mental health and well-being of the patient and family and look for signs of psychosocial problems.
- Monitor for diabetes from 10 years of age: continuous glucose monitoring, serial glucose levels over several days or oral glucose tolerance test.

Counselling

- Provide information on available local resources and support groups.
- Counsel patient and caregivers on avoiding and managing complications.
- Advise that regular physical activity like running, swimming or football can help improve both lung function and overall health.
- Advise that a good diet is important because mucus and exocrine pancreas insufficiency can make it difficult to digest food and absorb nutrients.

Immunization

- Provide routine annual immunization, including annual influenza vaccination for the child and family and caregivers.

7.13 Diabetes mellitus

Diabetes mellitus is a metabolic disease characterized by persistent high blood glucose levels. Type 1 diabetes is the most common form in children and adolescents. The prevalence of type 2 diabetes has been increasing in recent years. Type 1 diabetes results from insufficient insulin production while type 2 results from a decreased response of cells to insulin.

Symptoms

Symptoms between type 1 and type 2 diabetes differ (Table 104). Distinguish between the two types to ensure appropriate treatment.

Table 104. Differential diagnosis of type 1 and type 2 diabetes

Type 1 diabetes mellitus	Type 2 diabetes mellitus
Risk factors	
■ Other autoimmune conditions, e.g. coeliac disease, Hashimoto's thyroiditis	■ Family history of type 2 diabetes ■ Obesity and physical inactivity ■ High-prevalence populations
Onset and symptoms	
■ Sudden onset in childhood, peaks at 4–6 and 10–14 years ■ Weight loss and thin appearance ■ Diabetic ketoacidosis often first manifestation	■ Asymptomatic or slow onset ■ Obese at presentation ■ Symptoms of complications may be first clinical signs (Table 106, p. 607)
■ Polyuria (secondary enuresis and nocturia in children) ■ Polydipsia (excessive thirst)	

Diagnosis

Early recognition of type 1 diabetes mellitus is essential. Refer to hospital if you suspect diabetes in children with new onset of symptoms.

- Fasting plasma glucose ≥ 7 mmol/L (≥ 126 mg/dL) after 8 hours' fasting
- Glycated haemoglobin (HbA1c) > 6.5%
- 2-hour plasma glucose ≥ 11.1 mmol/L (≥ 200 mg/dL) after oral glucose tolerance test (75 g glucose or 1.75 g/kg given as a sweet drink after fasting)

▶ If there is a suspicion of diabetes, refer urgently to hospital for confirmation of diagnosis and initiation of therapy.

Emergencies in children with diabetes

! Diabetic ketoacidosis and severe hypoglycaemia are EMERGENCIES.

Diabetic ketoacidosis is often the first manifestation at diagnosis due to insulin deficiency or omitted or insufficient insulin dose and an acute illness: blood glucose > 11.1 mmol/L or > 200 mg/dL + ketonuria + acidosis.

RED FLAGS

- Frequent vomiting and acute abdominal pain
- Flushed cheeks
- Acetone smell on breath
- Kussmaul respiration (deep, rapid, sighing)
- Dehydration due to continuing polyuria
- Decreased level of consciousness, shock, coma, seizures.

▶ Stabilize (p. 739) and refer immediately to hospital.

Severe hypoglycaemia is caused by an excess of insulin compared to food intake during the treatment of diabetes: blood glucose ≤ 3 mmol/L or ≤ 54 mg/dL + inability to self-treat. Young children are often unable to communicate symptoms of hypoglycaemia.

RED FLAGS

- Trembling or shaking
- Rapid heart rate or pounding, palpitations
- Pallor, hunger, nausea, sweating, headaches, vomiting
- Irritability, erratic, nightmares, inconsolable crying

- Inability to concentrate, blurred or double vision, slurred speech, confusion, dizziness, loss of consciousness, seizures.

▶ Give 10% glucose IV 3 mL/kg slowly (Chart 13, p. 728) and refer immediately to hospital.

Note: children with mild hypoglycaemia are able to recognize symptoms and self-treat without assistance. Counsel adolescents and caregivers on self-management of mild hypoglycaemia (p. 608).

Long-term management of type 1 diabetes

Diabetes is a chronic condition that requires a multidisciplinary approach.

▶ Coordinate care and education with specialists in diabetes management and a multidisciplinary team (nurse educator, dietitian, mental health specialist).

▶ Provide close follow-up, especially in the initial phase after the diagnosis. Ensure that the child and family know the most essential skills to safely manage diabetes.

▶ Design a personalized management plan, together with the specialist and team, to achieve the best possible glucose control and long-term management for the child and family. The plan should be based on the child's age, maturity and ability to communicate symptoms and participate in self-management.

Insulin therapy

▶ Refer to a specialist in diabetes management for initiation of insulin therapy.

▶ Follow specialist recommendations regarding the insulin regimen.

DO NOT give metformin to children with type 1 diabetes.

Good nutrition and physical activity should complement insulin therapy.

General principles for insulin therapy for adolescents:

- Adolescents > 40 kg require on average 40 units insulin per day (20 units basal insulin for metabolism and 20 units bolus insulin for calorie consumption). Younger children require less insulin per day.

- In adolescents > 40 kg: 10 g carbohydrates increase blood glucose level by 30–40 mg/dL (1.7–2.2 mmol/L)
- In adolescents > 40 kg: 1 unit insulin lowers blood glucose level by 30–40 mg/dL (1.7–2.2 mmol/L). In younger children 1 unit insulin lowers blood glucose level much more, i.e. 70–100 mg/dL.
- In adolescents > 40 kg: 1 insulin unit is required for 1 carb unit (= 10 g carbs), on average.

Different insulin therapy regimens exist (see Table 105 for available types of insulin):

- Conventional insulin therapy: fixed regimen of insulin injections (mix of short-acting and intermediate-acting insulin), usually twice daily with self-monitoring of blood glucose levels.
- Intensified conventional therapy: basal-bolus regimen: basal (long-acting) insulin 1–2 times/day + bolus (short-acting) insulin injection before meals adjusted to preprandial blood glucose measurements.
- Continuous subcutaneous insulin infusion: insulin pump therapy with or without integrated continuous glucose sensors and automated dose adjustments.

Monitor for the following phenomena during insulin therapy:

- Honeymoon period diabetes: temporary reduction in exogenous insulin demand after beginning of insulin treatment.

  DO NOT abandon insulin therapy during this period.
- Dawn phenomenon (common): elevated blood glucose levels in the early morning due to physiological increase in growth hormone levels causing increased insulin demand.
  - ▶ Measure nocturnal blood glucose before giving insulin.
  - ▶ Give long-acting insulin dose later (around 11 p.m.) or increase dose under careful glycaemic control.
  - ▶ Consider treatment with insulin pump.
- Somogyi effect (rare): elevated blood glucose levels in the early morning due to evening insulin injection causing a fall in blood glucose levels.
  - ▶ Reduce the evening dose of the long-acting insulin.

Table 105. Available types of insulin

Insulin types	Onset	Peak	Effective duration	Timing
Rapid-acting e.g. Aspart®, Lispro®, Glulisine®	15–30 min	1–2 h	3–5 h	Immediately prior to meal
Short-acting e.g. Actrapid®, Humulin R®, Insuman Rapid®	30–60 min	2–4 h	5–8 h	30 min prior to meal
Intermediate-acting e.g. Humulin NPH®, Protaphane®, Insulatard®	2–4 h	4–10 h	12–24 h	30 min prior to meal
Long-acting e.g. Detemir® Glargine®	1–2 h 2–4 h	6–12 h None	20–24 h ≤ 24 h	1–2x/day 1–2x/day
Premixed Rapid/long-acting mix or short/long-acting mix 30/70 or 25/75	30 min	4–12 h	8–24 h	30 min prior to meal

Counselling on diabetes self-management technique

- Counsel caregivers as well as the child or adolescent on:
  - The interaction between insulin, diet, exercise and their effect on blood glucose levels
  - Monitoring of blood glucose levels and targets (p. 608)
  - The different types of insulin, their duration and action (Table 105)
  - Correct insulin injection technique (p. 610)
  - Considerations regarding nutrition and weight
  - Management during illness (p. 609)
  - Management during physical activity (p. 609)
  - Recognizing and managing hypoglycaemia (p. 608).

Supervision

- Ensure that responsible, supervising adults, e.g. teachers, sports coaches, are identified and trained to detect and respond to hypoglycaemia at school, day-care and during sport activities.

Immunization

- Ensure that all vaccinations are up to date according to the national immunization schedule. Ensure pneumococcal and annual influenza vaccination.

Nutrition and weight

- Refer to a dietitian for counselling on carbohydrate counting and a diet that ensures adequate nutritional intake. This is especially important in children, who need to adjust premeal insulin boluses based on blood glucose levels and the anticipated effect of consumed carbohydrates on blood glucose levels.
- Young children have inconsistent food intake. This can be addressed by frequent blood glucose monitoring or use of an insulin pump.
- Advise on the importance of maintaining a healthy weight. Failure to reduce insulin dose when indicated may lead to excessive weight gain. If the child becomes overweight, caloric intake or insulin doses may need to be reduced.

Monitoring

- Measure HbA1c at least four times a year. HbA1c target of < 6.5% reduces risk of long-term complications.
- Monitor and regularly assess at routine visits:
  - — Diabetic control:
    - Episodes of hypoglycaemia, diabetic ketoacidosis, hospital admission
    - Stepwise hypoglycaemia treatment known and readily available
    - Interference with school, exercise and social life
    - Appropriate insulin regimen and correct bolus doses given
    - Healthy diet.
  - — Adherence to therapy: in the event of suboptimal blood glucose control, raise the issue of non-adherence in a nonjudgmental and

sensitive manner: main concerns and issues? Help needed to achieve any short-, medium- and long-term goals (e.g. sports, academics, social life, family, professional) to support adherence?

— Normal growth (p. 20) and pubertal development (p. 674).

▶ Monitor for complications of diabetes (Table 106) at diagnosis and at routine visits thereafter.

Table 106. Complications of diabetes and monitoring

Complications	Monitoring
Thyroid disease	• Check for thyroid enlargement • Thyroid function test
Retinopathy	• Refer to ophthalmologist for evaluation yearly starting at age 12
Hypertension	• Measure blood pressure (p. 789, p. 342)
Neuropathy	• Examine extremities for numbness, pain, paraesthesia
Nephropathy	• Urine albumin-to-creatinine ratio in a spot specimen: if moderately increased albuminuria (3–30 mg/mmoL), repeat within 1 month
Dyslipidaemia	• Lipid profile: total cholesterol, triglycerides, HDL, LDL
Psychological issues	• Assess for signs of depression (p. 526), anxiety (p. 534), school absences, eating problems (p. 546), family conflict, risky behaviours (smoking, alcohol)
Skin problems	• Inspect injection sites for lipohypertrophy or atrophy

Counselling box 41. Considerations in children and adolescents with diabetes

Considerations in children and adolescents with diabetes

Blood glucose levels and targets

Maintaining blood glucose levels at the lower end of the target ranges is important to achieve the lowest possible HbA1c, normal growth, development and to prevent complications. Blood glucose targets are:

- Fasting glucose level: 4–7 mmol/L (72–126 mg/dL) on waking before breakfast
- Plasma glucose level: 4–7 mmol/L (72–126 mg/dL) before other meals
- Plasma glucose level: 5–9 mmol/L (90–162 mg/dL) after meals.

▶ Measure blood glucose levels several times daily (at least 5) with a glucose meter using fingerstick sampling or a continuous glucose monitoring device. Adjust insulin dosing accordingly.

▶ Measure more frequently during physical activity or illness, both of which require insulin adjustments.

Low blood glucose

If the blood glucose is ≤ 3 mmol/L or ≤ 54 mg/dL or the child has symptoms of low blood glucose (note: young children may not be able to recognize and communicate symptoms of low blood glucose):

▶ **Step 1:** Give 150–200 mL of a sugary drink or fruit juice or 3–4 teaspoons of sugar or honey.

▶ **Step 2:** In the event of a missed meal (with insulin as usual): follow with a meal including appropriate carbohydrates.

▶ **Retest:** Confirm normal blood glucose level (> 5.6 mmol/L, 100 mg/dL) 10–15 minutes after treatment. If blood glucose level remains low or symptoms persist **repeat Step 1**.

▶ Seek advice from your doctor or call the emergency service if the child shows any signs of severe hypoglycaemia:

- — Inability to self-treat
- — Trembling or shaking
- — Rapid heart rate or pounding, palpitations
- — Pallor, hunger, nausea, sweating, headaches, vomiting
- — Irritability, erratic behaviour, nightmares, inconsolable crying, inability to concentrate, blurred or double vision, slurred speech, confusion, dizziness, loss of consciousness, seizures.

Counselling box 41. Considerations in children and adolescents with diabetes
Continued

Considerations in children and adolescents with diabetes

Illness

Many illnesses cause elevated blood glucose levels due to stress and an increase in insulin demand. Vomiting and diarrhoea lead to decreased glucose uptake and a decrease in insulin demand.

- Seek prompt treatment for infections. Give paracetamol for fever.
- Never stop insulin: even if the child is unwell and cannot eat.
- Measure blood glucose more frequently (at least every 4 hours, including overnight) and check urine for ketones.
- If blood glucose levels are above 14 mmol/L (250 mg/dL) or urine ketone levels are moderate, repeat testing at least every 2 hours.
- Give your child plenty of fluids (up to one extra litre per day). If your child is unable to eat solids, replace meals and snacks with fluids containing carbohydrates.
- Seek urgent advice from your doctor if you do not have a sick-day plan or are unsure how much insulin to give. Go to the Emergency Department if the condition deteriorates.

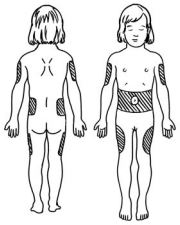
Physical activity

Regular exercise is important for the child's overall health and social life, but it still requires caution, as hypoglycaemia may arise during or after exercise or be delayed by several hours.

- Increase blood glucose monitoring (before and after exercise, and sometimes even during, in the event of prolonged strenuous exercise) and adjust insulin dosing accordingly.
- Afternoon or evening exercise may cause hypoglycaemia later that night. Check blood glucose overnight after strenuous exercise.
- Avoid exercise if pre-exercise blood glucose levels are high. (> 14 mmol/L, 250 mg/dL) with ketonuria.

Counselling box 42. Correct insulin injection technique

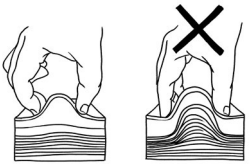
How to inject insulin correctly



Insulin injection sites

1. Choose an injection site (see illustration):
   - Rotate injection sites: use a different site each time to avoid bumps or pits in the skin.
   - Keep 2.5 cm distance from scars and 5 cm from navel.
   - **DO NOT** inject in a site that is bruised, swollen, tender, lumpy, firm or numb.

2. Gently pinch the skin. The insulin needs to go into the fat layer under the skin. Lift the skin between thumb and two fingers with one hand, pulling the skin and fat away from the underlying muscle.



3. Put in needle at a 90° angle. For leaner children, you may inject at a 45° angle.
4. Push the needle all the way into the skin. Let go of the pinched skin and inject all the insulin slowly and steadily.
5. After injecting, wait about 5 seconds before pulling out the needle at the same angle it went in.
6. Place the needle and syringe in a safe, hard container. Close the container and keep it safely away from children.

! Never reuse needles or syringes.

Adolescents with diabetes

Adolescence is a challenging period that brings many psychological and physical changes. For more information on special considerations for managing chronic conditions in adolescents, see p. 707.

- Encourage adolescents to assume increasing responsibility for their diabetes management, with adequate support from their caregivers.
- Assess for signs of eating disorders (p. 554) and intentional insulin misuse as a means of weight control in adolescent girls, as they are at increased risk of eating disorders. Poor glycaemic control resistant to attempts at improvement or recurrent diabetic ketoacidosis may be a sign of intentional insulin misuse.
- Monitor for signs of depression (p. 526).
- Counsel adolescents to:
  - — Limit alcohol consumption to a maximum of one drink per day, as alcohol can lead to severe hypoglycaemia.
  - — Always carry a carbohydrate snack with them and eat it before and after drinking.
  - — Monitor blood levels to assess any immediate or delayed effects of alcohol.
  - — Test blood glucose levels before driving. The target is at least 5 mmol/L (90 mg/dL).

Management of type 2 diabetes in children and adolescents

Type 2 diabetes in children and adolescents is uncommon and should be managed by a specialist.

- Follow the specialist's diabetes management regimen.
- Provide healthy lifestyle counselling including diet modification and increased physical activity.

7.14 Thalassaemia

Thalassaemias are a group of autosomal-recessive hereditary blood disorders, which are characterized by defective haemoglobin chains. Based on the defective globin chain, they are classified as either α- or β-thalassaemia. They are more common in Mediterranean countries but immigration has led to wider distribution.

History

Assess for risk factors:

- Family history of α- or β-thalassaemia
- History of recurrent need for transfusions in patient or family member
- Prenatal diagnosis declined by the pregnant woman or couple at risk of thalassaemia carrier status
- Ethnic background from sub-Saharan Africa, Mediterranean and Arabian peninsula, Southeast Asia, Indian subcontinent.

Symptoms

Symptoms and timing of clinical manifestation depend on the type of thalassaemia. Severity of symptoms ranges from asymptomatic minor forms or silent carrier status to death in utero in severe forms (alpha-thalassaemia major).

Symptoms include:

- Pallor
- Abdominal distension
- Failure to thrive, poor feeding, decreased activity, lethargy
- Enlarged liver and spleen
- Jaundice
- Symptoms of gallstones: sudden intense pain in upper right abdomen
- Skeletal deformities: large head with frontal and parietal bossing, “chipmunk” facies, misaligned teeth.

Investigations

- Full blood count: microcytic hypochromic anaemia
- Ferritin
- Further investigations: peripheral smear, DNA analysis, X-ray for skeletal deformities.

Avoid unnecessary testing and therapy such as iron supplementation.

Differential diagnosis

For differential diagnoses of anaemia, see p. 408.

Management

- Refer to a specialist for further investigations and treatment if you suspect thalassaemia in children with:
  - — Risk factors and typical symptoms (below)
  - — Treatment-refractory microcytic hypochromic anaemia (often misdiagnosed as iron-deficiency anaemia).
- More severe forms (beta-thalassaemia major and intermedia, haemoglobin H disease) require transfusions and iron-chelation therapy. Follow up and prescribe according to specialist advice.
- Treat secondary iron overload with chelating agents (deferasirox or deferoxamine) in consultation with specialists.
- Minor forms and silent carriers do not require treatment and transfusions.

Immunization

- Provide immunizations as per local routine immunization schedule (p. 69). Ensure pneumococcal and annual influenza vaccination.

Monitoring

When left untreated, severe forms of thalassaemia can lead to heart disease, chronic hepatitis, endocrine problems (e.g. diabetes, hypothyroidism, hypogonadism), growth problems due to iron overload in these organs. In children who require frequent transfusion therapy:

- Monitor regularly serum ferritin, iron and transferrin saturation levels and look for signs of secondary iron overload:
  - — Fatigue, abdominal pain, liver enlargement
  - — Bronze-coloured skin pigmentation
  - — Diabetes: polyuria, polydipsia
  - — Joint pains
  - — Erectile dysfunction
  - — Heart failure.

Prevention

- Pre-conceptionally: refer for carrier screening if partners belong to an ethnic population at higher risk of being carriers and are consanguineous. If both partners are found to be carriers of thalassaemia, a haemoglobin variant or a combination, refer for genetic counselling.
- Early in the pregnancy: offer prenatal diagnosis and counselling to the pregnant woman or couple at risk of having a fetus affected with thalassaemia.

7.15 Sickle cell disease

Sickle cell disease is a disease of the red blood cells caused by an autosomal-recessive gene defect in the beta-chain of haemoglobin (HbA), which results in the production of sickle cell haemoglobin (HbS). Red blood cells containing sickle haemoglobin become rigid and deform into a sickle (crescent) shape.

Diagnosis

The disease can be diagnosed through neonatal screening programmes. If the infant or child has not been diagnosed through neonatal screening, suspect sickle cell disease in children with typical history and symptoms (see below).

History

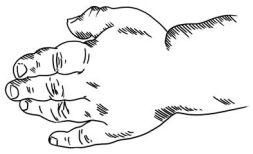
Assess for:

- Family history with parent(s) diagnosed with sickle cell anaemia
- Ethnic background from Mediterranean and Arabian peninsula, Southeast Asia, Indian Subcontinent, sub-Saharan Africa
- Symptom triggers of sickle crises: stress, hypoxia, acidosis, fever, hypothermia, extreme exercise, infections and dehydration.

Symptoms

Clinical manifestations and severity depend on the haemoglobin phenotype. Symptoms manifest around 4–6 months of age:

- Swelling of the joints and bones, especially dactylitis through occlusion of small vessels



Dactylitis: swelling of the joints

- Persistent pain in bones, chest or abdomen
- Protuberant abdomen (enlarged spleen) with umbilical hernia
- Acute chest syndrome: fast breathing, pneumonia-like symptoms
- Failure to thrive
- Visual floaters
- Jaundice, pallor, lethargy.

Investigations

- Blood count and peripheral blood film
- Confirmatory tests (DNA analysis or haemoglobin analysis).

Management

Care coordination

- Refer to specialist for diagnosis and management.
- Collaborate with the specialist. Follow up on management plan and provide support to the child or adolescent and their family.

Prevention and treatment of infections

- Provide antibiotic prophylaxis with oral penicillin V in children < 5 years of age: 125 mg twice daily for children younger than three years; 250 mg twice daily for those three years and older until at least five years of age.
- Provide immunizations as per local routine immunization schedule including *H. influenzae* and pneumococcal immunization (p. 69).
- Treat infections promptly. Fever with or without a clinical focus of infection is a medical emergency and requires referral for prompt evaluation and antibiotics (Table 107).

Management of pain

- Manage acute or chronic pain (p. 506).
- Consider prophylactic treatment with hydroxyurea in children ≥ 2 years to decrease the frequency of pain episodes and dactylitis, reduce transfusion requirements and lessen the risk of acute chest syndrome or stroke.

Counselling

- Counsel to avoid triggers, e.g. dehydration, cold, extreme exercise and high altitudes.
- Provide nutritional counselling (p. 81).

Monitoring

- Monitor for and manage acute complications of sickle cell disease and refer for specialist treatment, when needed (Table 107).

Table 107. Complications of sickle cell disease

Complications	Symptoms and signs	Management
Anaemia	■ Onset at 3–4 months of age ■ Excessive fatigue ■ Dyspnoea ■ Pallor	▶ Consider hydroxyurea in children aged ≥ 2 years. ▶ Consider repeated blood transfusion. Caution: iron overload and overtransfusion (measure baseline to determine transfusion needs)
Iron overload from chronic transfusions	■ Increased serum ferritin	▶ Treat with deferoxamine, deferiprone or deferasirox.
Dactylitis	■ Swelling of dorsal aspects of hands and feet ■ < 5 years of age	▶ Pain control and hydration. ▶ Consider hydroxyurea in infants.
Acute chest syndrome	■ Chest pain (p. 319) ■ Fever ■ Fast breathing ■ Cough ■ Dyspnoea, hypoxia ■ Can be clinically similar to pneumonia	Refer for: ▶ Chest X-ray to check for new infiltrate. ▶ Pain control and hydration. ▶ Oxygen therapy, blood transfusions, antibiotics.

Complications	Symptoms and signs	Management
Infections	■ Fever ■ Look in particular for signs and symptoms of pneumonia (p. 184), cellulitis (p. 394), osteomyelitis (p. 422), sepsis (p. 736) and meningitis (p. 235).	▶ Refer children with fever to hospital for investigations and parenteral antibiotics. If referral is delayed, give ceftriaxone IM or IV 50 mg/kg (max. 2 g). Children with sickle cell disease need different antibiotic regimens than children without.
Vaso-occlusive crisis	■ Severe skeletal pain	▶ Pain control and hydration. ▶ Watch for complications (e.g. acute chest syndrome with abdominal or back vaso-occlusive crisis).
Growth problems	■ Growth failure ■ Delayed puberty	▶ Nutritional supplements.
Leg ulceration	■ > 10 years of age ■ Medial/lateral malleolar area	▶ Elevation, zinc sulfate pressure dressings.
Priapism (p. 381)	■ Prolonged penile erection lasting > 4 hours ■ 90% of males	▶ Urological emergency. ▶ Refer immediately for urgent treatment.
Opioid dependence and tolerance	■ Reduced responsiveness to opioids after prolonged intake	▶ Change opioid and increase dosage.
Renal problems	■ Proteinuria	▶ Yearly screenings for the presence of increased urinary albumin excretion. ▶ Refer to specialist.

Complications	Symptoms and signs	Management
Splenic sequestration crisis	■ Massive splenomegaly ■ Hb decrease > 2 g/dL ■ Dyspnoea ■ Shock	▶ Refer urgently to hospital for volume expansion and transfusion; possibly splenectomy.
Recurrent cholecystitis and gallstones	■ Jaundice and enlarged liver ■ Right upper quadrant or epigastric pain	▶ Refer for elective cholecystectomy.
Chronic lung and cardiac problems (e.g. pulmonary hypertension)	■ Heart murmur ■ Dyspnoea	▶ Refer to specialist.
Cerebro-vascular accidents (stroke)	■ Sudden neurological deficits: difficulty with language, writing or reading; seizures; motor and sensory deficits; altered consciousness.	▶ Refer immediately.

7.16 Cancer

Paediatric cancers differ greatly from adult malignancies in prognosis and histology. Early diagnosis is essential to offer the child with cancer the best chances to survive. The primary care provider should be able to identify children with cancer and enable timely referral to specialist facilities. Depending on site and origin, the clinical manifestations of cancer in children vary. For clinical presentation of common paediatric cancers, see Table 108, p. 620.

History

Consider signs and symptoms that might be associated with cancer during every visit. Assess:

- Presence of any red flag symptoms (see below)
- Vaccination status.

RED FLAGS

- Persistent or recurrent pain, especially if it wakes the child at night
- Persistent fever (more than 7 days)
- Persistent fatigue
- Heavy or nocturnal sweating
- Loss of appetite
- Weight loss (see growth monitoring, p. 20)
- Headache (intensifying, wakes the child at night)
- Vomiting
- Unexplained anaemia
- Blurred or double vision, sudden blindness
- Bone pain (increasing, interrupting the child's activities).

Examination

Pay attention to the 4 Bs – "blood, brain, belly, bone" – during the physical examination to find possible signs of malignancy.

Look for signs that may indicate cancer:

- Bleeding manifestations: petechiae, bruises, bleeding, ecchymoses (not related to trauma), epistaxis, gingival bleeding, gastrointestinal bleeding, urogenital bleeding, purpura
- Severe palmar or conjunctival pallor
- Swollen lymph nodes > 2.5 cm, hard/firm consistency, painless, lasting > 4 weeks
- Palpable abdominal mass
- Enlarged liver or spleen
- Enlargement of a body part, e.g. testicles, limbs
- Eye abnormalities: leukocoria (white eye), new strabismus, heterochromia (different eye colours), hyphaema (blood in the eye), proptosis (bulging eye)

Leucocoria

- Focal neurological signs with sudden or progressive onset:
  - convulsion without fever or underlying neurological disease
  - unilateral weakness
  - facial asymmetry
  - change in consciousness, mental status, behaviour
  - confusion
  - loss of balance when walking
  - limping from pain
  - difficulty speaking.

Table 108. Common paediatric cancers and their clinical presentation

Type of cancer	In favour (age group and clinical signs)
Leukaemia (i.e. acute lymphoid leukaemia, acute myeloid leukaemia)	• All age groups: most common malignancy in childhood • **Triad of fever, anaemia and bleeding** (petechiae, ecchymoses, spontaneous gingival bleeding), enlarged liver and spleen, adenomegaly, infiltration of other organs (testes, central nervous system or kidneys)
Lymphoma	• > 5 years • **Cervical, supraclavicular lymphadenopathy**, depending on the extent of mediastinal involvement: cough, dyspnoea
Tumours of central nervous system	• 5–10 years • **Diverse neurological signs** such as irritability or headache, ataxia, double vision, increase in head circumference, nausea and vomiting secondary to intracranial hypertension, visual or auditory disturbances, personality changes, regression in development, convulsions
Wilms' tumour (kidney)	• < 3 years • Palpable abdominal mass, pain, haematuria, hypertension, constipation, anaemia, fever
Neuroblastoma	• < 5 years • Palpable mass, "raccoon" eyes, scalp masses, symptoms reflecting the tumour site and extent of disease

Type of cancer	In favour (age group and clinical signs)
Osteosarcoma and Ewing sarcoma	• > 10 years • **Painful limp or extremity**, enlargement of the affected area without a history of trauma
Retinoblastoma	• < 3 years • **Leukocoria** (white eye), strabismus, heterochromia
Rhabdomyo-sarcoma	• < 11 years • Painful or painless mass that grows quickly and invades neighbouring structures
Germ cell tumour	• < 4 years and > 15 years • Abdominal mass, solid mass in the testes, vomiting, anorexia, chronic pain, constipation, genitourinary disorders, absence of menstruation

Investigations

- Full blood count including haemoglobin, erythrocytes, reticulocytes, leukocytes, thrombocytes, iron, ferritin and peripheral blood smear to search for abnormal cells.
- Exclude other possible causes of loss of appetite, weight loss or fatigue, and test for tuberculosis (p. 631) and HIV/AIDS (p. 623).

Management

Care coordination

- If you suspect cancer in a child, refer the child to a specialized haematology/oncology center that provides integrated patient management by a multidisciplinary team.
- Closely cooperate with the multidisciplinary team and follow specialist advice for supervising phases of home treatment and coordinating supportive treatment.

Routine health care

- Provide immunizations as per local routine immunization schedule including pneumococcal immunization (p. 69).

Monitoring

- Monitor for complications (see danger signs below) and refer the child to hospital. Complications of any kind in children with cancer are always emergencies.

Counselling and support

- Provide psychosocial services for the child and family.
- Counsel the parents or caregivers:
  - — Cancer is a curable disease with proper treatment
  - — Alternative treatments and special diets do not cure cancer. If these are not harmful and the family relies on them and uses them without stopping or changing the underlying management protocol, they may continue them. It is crucial not to stop treatment in the false expectation of a cure by alternative treatments.
- Counsel on the importance of strictly complying with the treatment recommended by the oncology team and help the family complete the prescribed treatment and follow-up regimen.
- Recommend that the child returns to school based on the treatment protocol and degree of immunosuppression.
- Counsel on key practices, such as feeding and home care by parents and family, e.g. how to give oral treatments at home.
- Counsel parents to seek immediate medical care if the child develops any of the following danger signs:
  - — Fever (any fever in a child receiving chemotherapy must be investigated)
  - — Vomiting
  - — Inability to drink liquids
  - — Bleeding manifestations
  - — Breathing difficulties
  - — Severe pallor
  - — Not looking well or worsening.
- Counsel adolescents about oncofertility options, e.g. gamete preservation. Arrange timely referral prior to initiation of cancer treatment.
- Provide palliative care when appropriate, in particular after treatment failure (p. 655).

7.17 HIV/AIDS

Infants are at risk of contracting HIV vertically by mother-to-child transmission if they are exposed to HIV in utero and peripartum and during breastfeeding. Children infected with HIV usually become symptomatic during their first years of life. Adolescents may contract HIV through unprotected sexual intercourse or intravenous drug injection.

Symptoms

Clinical manifestation of HIV infection in children is highly variable and depends on the stage of infection. While some children show severe HIV-related signs and symptoms in the first year of life, others remain asymptomatic or mildly symptomatic for more than a year. The following symptoms should prompt a first assessment and, if needed, referral to a specialist.

Signs that may indicate HIV infection

- Generalized lymphadenopathy in ≥ 2 extra-inguinal regions
- Recurrent bacterial infections (pneumonia, meningitis, sepsis, cellulitis): ≥ 3 severe episodes in past year
- Persistent or recurrent fever: > 38 °C for ≥ 7 days
- Chronic parotitis: parotid swelling for ≥ 14 days
- Oral thrush: erythema and white-beige pseudomembranous plaques on the palate, gums and buccal mucosa extending beyond tongue or oesophageal candidiasis (> 30 days, recurring)
- Neurological dysfunction: progressive neurological impairment, microcephaly, developmental delay, hypertonia, mental confusion
- Herpes zoster
- Tuberculosis: cough, fever, weight loss, night sweats (p. 632)
- Enlarged liver in the absence of viral infections such as CMV
- HIV dermatitis: erythematous rash; extensive fungal skin, nail and scalp infections or molluscum contagiosum.

Common signs in HIV-infected children (not specific to HIV)

- Chronic otitis media: ear discharge lasting ≥ 14 days
- Moderate or severe malnutrition: weight loss or gradual deterioration from expected weight gain, failure to thrive
- Persistent diarrhoea for ≥ 14 days.

Signs or conditions (specific to HIV)

Strongly suspect HIV infection if the following are present:

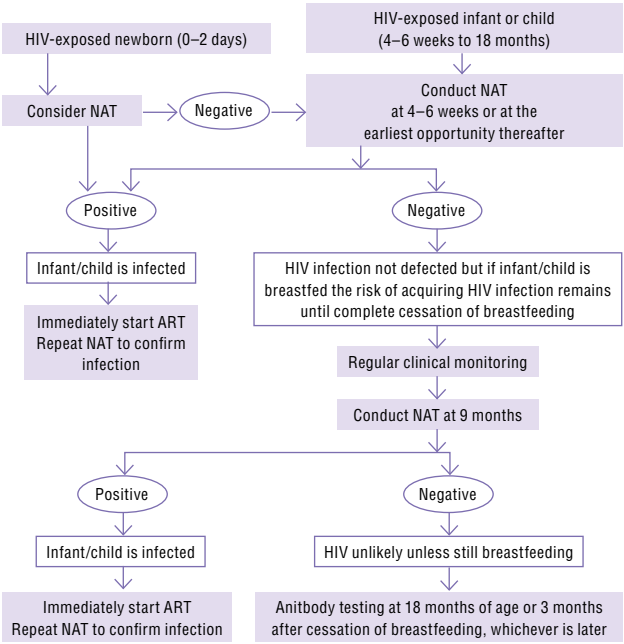
- Kaposi's sarcoma: nodular skin lesions and lesions on the palate
- Cryptococcal meningitis: signs of meningitis (p. 235)
- *Pneumocystis jiroveci* pneumonia: fever, dyspnoea, nonproductive cough
- Oesophageal candidiasis: dysphagia, white plaque associated with oral thrush.

Diagnosis

Early diagnosis is important for early initiation of antiretroviral therapy (ART) to prevent HIV progression and early death.

- Be aware of national guidelines for HIV counselling and testing
- Offer HIV testing to:
  - HIV-exposed infants during pregnancy, labour or postpartum
  - infants and children presenting with signs, symptoms or medical conditions that may indicate HIV infection
  - adolescents who report unprotected sexual intercourse
  - children or adolescents who experience sexual abuse.
- HIV testing depends on the child's age:
  - Infants and children < 18 months: virological testing for HIV DNA or RNA with nucleic acid tests (NATs). Use point-of-care test, if available. Test throughout the exposure period (see Early infant diagnosis algorithm, Fig. 2).
  - Children > 18 months: HIV antibody tests (may produce false negative results if performed in the window period, i.e. after HIV infection, but before measurable HIV antibodies are produced).
- Repeat testing for indeterminate results
- All positive test results need confirmatory testing.

Fig. 2. Early infant diagnosis algorithm for HIV



ART: antiretroviral therapy; NAT: nucleic acid tests

Disclosure of HIV diagnosis

Managing HIV diagnosis disclosure is a sensitive process and may affect the quality of the relationship with child and family.

- Be sensitive and ensure a private environment.
- Explain to the child (depending on age and capacity to understand) how body and immune defences including white blood cells work.
- Assess the disclosure situation for the family, household and friends. Discuss the following questions with the affected family members:
  - Who in the household knows about the child's infection?
  - Who knows about other family members' HIV infections?
  - Does the child know about the mother's HIV infection?
- Counsel the family that while the diagnosis may be a shock at first, normal life expectancy and good quality of life can be achieved through effective antiretroviral therapy.

Management

HIV treatment should be managed by specialists. Refer the child or adolescent to a specialist HIV centre or specialist for baseline investigations to facilitate clinical staging and decisions regarding treatment and drug combinations and formulations. Follow specialist advice regarding initiation and changes of antiretroviral therapy and primary co-trimoxazole prophylaxis.

Care coordination

- Coordinate care with the nearest HIV specialist or centre.
- Co-operate with the pharmacy to ensure that adequate supplies of ART are in stock to avoid treatment interruptions.
- Organize referral to other services, e.g. psychologist, dentist.
- Organize transition to adolescent or adult services.

Follow a family-centred approach

- Be aware how societal prejudices and stigma may affect the family's life. Respect confidentiality especially when handling files, in the waiting area, seeking prior consent when communicating, e.g. with institutions such as school or kindergarten, other health workers or the social services provider.

- Assess the family's readiness for a lifelong treatment. Any barriers in the household? Travelling plans?
- Assess psychosocial needs of the children and their families and provide support, when needed.
- Help build a support network for children and families (e.g. where to get information and advice, links to social services and peer groups).

General principles of HIV treatment

- HIV can be suppressed by treatment regimens consisting of a combination of ≥ 3 antiretroviral drugs (ARVs) from at least 2 different classes.
- ART does not cure HIV infection but suppresses viral replication effectively to undetectable viral load levels. This allows recovery of the immune system and prevents HIV transmission.
- Treatment should be started as soon as possible regardless of clinical status, CD4 cell count or age.
- Before initiation of treatment, baseline investigations for clinical staging need to be performed including immunological, virological and bacteriological tests, imaging and assessment for HIV-related opportunistic infections:
  - Full blood count
  - CD4 cell count (absolute and relative)
  - Renal and liver function tests
  - HIV viral load
  - Tests for hepatitis B and C and tuberculosis
  - Chest X-ray, abdominal ultrasound.
- ARVs are normally well tolerated in children; toxicities are rare with the recommended first-line regimen. Fewer ARVs are authorized for use in children than in adults.
- When choosing the first-line ARV regimen, a second-line ARV treatment regimen should also be considered (Table 109). Be aware of national treatment guidelines.

Table 109. Preferred first- and second-line ART regimen (see Annex 4 for dosages)

	First-line regimen (and alternative)	Second-line regimen
Neonates	**AZT + 3TC + RAL** AZT + 3TC + NVP	–
Infants and children	**ABC + 3TC + DTG** ABC + 3TC + LPV/r ABC + 3TC + RAL	AZT+ 3TC + LPV/r or ATV/r AZT or ABC + 3TC + DTG
Adolescents	**TDF + 3TC or FTC + DTG** TDF + 3TC + EFV 400mg	AZT + 3TC + ATV/r or LPV/r AZT + 3TC + DTG

3TC: lamivudine, ABC: abacavir, ATV/r: atazanavir/ritonavir, AZT: zidovudine, DTG: dolutegravir, EFV: efavirenz, LPV/r: lopinavir/ritonavir, NVP: nevirapine, RAL: raltegravir.

Primary prophylaxis for pneumocystis pneumonia

Co-trimoxazole prophylaxis prevents pneumocystis pneumonia and protects against common bacterial infections and toxoplasmosis.

- Follow specialist advice on initiation and discontinuation of prophylaxis.
- Ensure primary prophylaxis for children:
  - — < 5 years of age regardless of CD4 cell count or clinical stage
  - — with severe or advanced HIV clinical disease (WHO clinical stage 3 or 4)
  - — with CD4 count ≤ 350 cells/mm^3.
- Co-trimoxazole 6–8 mg/kg trimethoprim once daily (see dosages in Annex 4).
- Discontinue prophylaxis for children who are clinically stable and virally suppressed on ART for at least 6 months and with a CD4 cell count > 350 cells/mm^3.

Nutritional counselling

- Encourage mothers of infants and young children known to be infected with HIV to breastfeed exclusively for 6 months and to continue breastfeeding up to the age of 1 year.
- Refer to a nutritionist to ensure adequate energy intake and micronutrient intake, as HIV-infected children have increased energy needs.

Vaccination

- Ensure a complete vaccination status (p. 69) including *H. influenzae* type b and pneumococcal vaccine and according to national immunization schedules. DO NOT give BCG vaccine. Vaccinations with live vaccines (MMR, varicella) may be delayed in severely immunocompromised children.

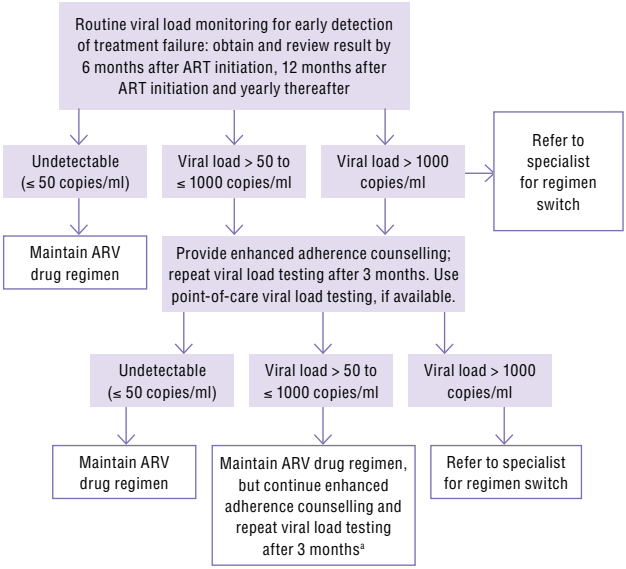
Follow-up and monitoring

The frequency of follow-up visits depends on the treatment response and should be arranged in agreement with the HIV specialist or centre. After initiation of treatment, follow up every two weeks to every month. Once viral load is suppressed to undetectable levels, the clinical condition has stabilized, treatment is tolerated and good adherence can be relied upon, intervals between visits can be extended to 3 to 6 months. Children who are clinically unstable should be seen more frequently.

Monitor treatment response at each visit and follow algorithm (Fig. 3):

- Assess nutritional status including weight, height and BMI (p. 20).
- Monitor for and manage side-effects of ART, e.g. headache, abdominal pain, pancreatitis, diarrhoea, nausea, anaemia, rash, hepatoxicity, peripheral neuropathy, lipodystrophy. The side-effects depend on the type of ARV.
- Laboratory investigations:
  - HIV viral load every 6–12 months (point-of-care viral load may be used)
  - Full blood count, haemoglobin, kidney and liver function tests, CD4 count (absolute and relative) to monitor for long-term toxicities and comorbidities.
- Monitor mental health, development and school performance. Provide psychosocial support, if possible in community programmes.
- Monitor for AIDS-defining conditions (see Symptoms, p. 623) and manage them accordingly.
- Assess adherence to treatment and provide adherence counselling:
  - Encourage adherence at every visit and praise children, adolescents and caregivers
  - Determine reasons behind missed appointments or medication
  - Explain that good medication adherence is crucial to suppress the HIV viral load successfully and prevent drug resistance.

Fig. 3. Treatment monitoring algorithm for HIV



[a] Consider referral to specialist for therapy switch based on clinical considerations and no adherence concerns.

Adolescents living with HIV

Adolescents have additional and special needs:

- Pay attention to adherence with medication and appointments and tailor them to their school and activity schedule.
- Provide information about disclosure to others, sexual health, their rights and responsibilities in protection and prevention within sexual partnerships, at school and at work.
- Direct the adolescent to informed and trusted peer groups, and internet resources for information and support.

For more information on the management of adolescents living with chronic conditions, see p. 707.

Prevention of HIV

Different types of HIV infection prevention exist, including:

- Prevention of mother-to-child transmission of HIV (p. 167)
- Pre-exposure prophylaxis for adolescents at high risk of HIV infection (p. 692)
- Post-exposure prophylaxis, e.g. after unprotected sexual intercourse (p. 686).

7.18 Tuberculosis

Tuberculosis (TB) infection and disease are caused by *Mycobacterium tuberculosis*.

TB infection: measurable immune response against part of the bacterium (e.g. tested by tuberculin skin test).

Latent TB infection (LTBI): infection has occurred but the infected person shows no sign or symptom of TB disease (see below).

- Risk factors for developing TB disease: child's age (the younger the child the more likely), HIV infection and severe malnutrition.
- TB infection in older children and adolescents can persist longer: they may develop TB disease later in life resembling TB disease in adults (post-primary progressive TB disease).

TB disease (active TB): clinical signs and symptoms, signs on chest X-ray, and culturable bacteria in patient samples.

- Can occur in almost any part of the body.
- Pulmonary TB is the most common manifestation in older children and adults.
- Extrapulmonary TB disease (involving tissues other than lung parenchyma) is more frequent in young children, especially disseminated ("miliary") TB disease and TB meningitis.

Know the incidence of TB infection and disease in your area to assess risk and guide the diagnostic process. The diagnosis of TB in children relies on a careful history of exposure, clinical examination and relevant investigations.

TB disease

Symptoms

Consider TB disease in any child with a history of:

- Exposure to infectious TB: shared the same enclosed living space with a person with new or recurrent TB for one or more nights or for frequent or extended daytime periods during the three months before the start of his or her current treatment (if any)
- Unexplained fever, especially when > 2 weeks
- Cough for > 2 weeks, with or without wheeze, persistent or not improving
- Weight loss/failure to thrive
- Night sweats in older children and adolescents
- Fatigue, reduced playfulness, decreased activity.

Examination

Tuberculosis can affect any organ system, but look especially for:

- Fluid on one side of the chest (reduced air entry, dullness on percussion)
- Enlarged, non-tender lymph nodes or a lymph node abscess, especially in the neck
- Signs of meningitis, especially when developing over several days
- Abdominal swelling, with or without palpable lumps, enlarged liver and spleen
- Progressive swelling or deformity in a bone or a joint, including the spine
- Weight loss or growth faltering (using standard growth charts, see Annex 3).

Investigations

Immunological tests indicate infection but do not allow a distinction between latent and active TB.

- Tuberculin skin test (Mantoux test): see p. 793 on how to perform an intradermal injection. Measure induration (not redness) after 48–72 hours. Test is positive if > 5 mm diameter in immunosuppressed children or > 10 mm diameter in all other children. Tuberculin skin test can be:
  - False positive in infection with non-tuberculous mycobacteria or prior Bacille Calmette-Guérin (BCG) vaccination

— False negative in malnutrition, HIV, immunosuppression, recent measles, miliary TB.

- Interferon gamma release assays on patient blood samples. Test is specific for *M. tuberculosis* infection
- Refer for smear microscopy, culture or molecular test such as Xpert® MTB/RIF on a specimen sample to confirm the diagnosis. Culture and molecular tests both allow drug susceptibility testing for drug-resistant TB. If bacteriology confirmation fails, a presumptive diagnosis of TB disease can be made based on the history of exposure and clinical findings.
- Additional investigations: chest X-ray, HIV testing (p. 624).
- When suspecting extrapulmonary TB: consider CT scan, lumbar puncture, abdominal ultrasound.

Management

- Clarify your role in diagnosis, treatment and reporting to TB specialist services (often national TB programmes).
- Organize early referral of all confirmed or strongly suspected cases to TB specialists to start TB treatment using paediatric, dispersible, fixed-dose combination tablets and weight band-based dosing tables, following national TB guidelines.
- Be familiar with the national TB guidelines:
  — In principle, a shorter intensive phase (3–4 drugs: isoniazid, rifampicin, pyrazinamide, ethambutol) for 2 months is followed by a longer continuation phase (2 drugs: isoniazid and rifampicin) for 4 months (see dosages in Annex 4). Treatment depends on severity and manifestation, drug susceptibility and adherence.
  — Children on second-line treatments for drug-resistant TB require longer, more complex and less well-tolerated treatments.
- Identify child contacts and index patients (see Contact screening, p. 634).
- Provide support. Counsel and inform caregivers and children:
  — Tuberculosis is curable with a complete course of effective combination therapy
  — Adherence is crucial for treatment success and to prevent drug resistances

— Toxicities are rare at the recommended dosages

— Adequate nutrition is necessary for good recovery (see Nutritional counselling, p. 81).

Follow-up

Monitor treatment response and support adherence.

- Directly observed therapy supports adherence.
- After a month of effective treatment, clinical improvement and weight increase may be observed and doses will require regular adjustment based on weight gain.
- A sample should be obtained after completion of the intensive phase for bacteriological examination.
- After the intensive phase, follow-up can be monthly.

Prevention of tuberculosis

Vaccination

BCG vaccine is a live attenuated bacterial vaccine. It protects mostly young children from developing disseminated disease or severe organ manifestations early in life. It is contraindicated in children with known HIV infection. Many countries with a low incidence of TB have abandoned general BCG vaccinations in view of its only moderate protective effectiveness and local complications.

Contact screening

If a patient is diagnosed with sputum smear-positive pulmonary TB, evaluate all household members for active TB disease or latent TB infection and provide treatment accordingly.

Management of a child who is a contact of a person with TB

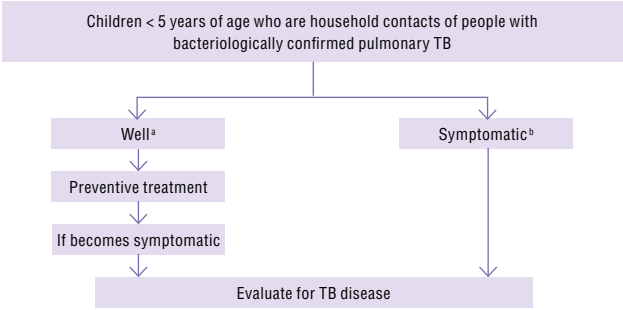
Children under 5 years of age and children with immunocompromising conditions are at greater risk of developing the disease and should be assessed thoroughly.

- Follow the algorithms for the management of household contacts of people with TB: Fig. 4 for infants and children < 5 years of age and Fig. 5 for children > 5 years of age and adolescents.

Preventive treatment of latent TB infection (LTBI)

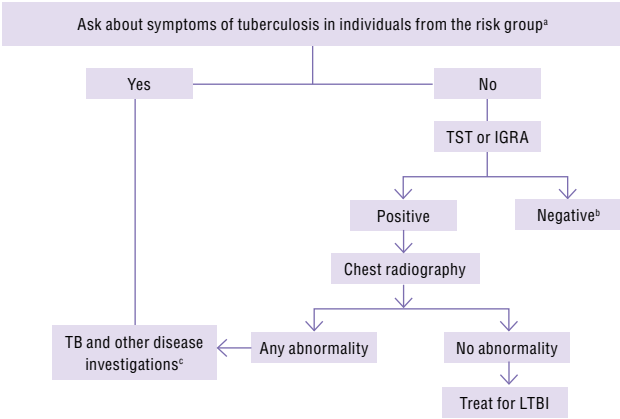
- Make sure TB disease is excluded (see algorithms below) before starting preventive treatment.
- Treatment options for LTBI are: isoniazid daily for 6 months; or rifampicin and isoniazid daily for 3 months; or (in the event of resistance to isoniazid) rifampicin daily for 4 months. For dosages see Annex 4.

Fig. 4. Algorithm for screening infants and children < 5 years of age who are contacts of people with TB



[a] Free of any TB- and non-TB-related symptoms.
[b] Common TB-related symptoms: see p. 632.

Fig. 5. Algorithm for targeted diagnosis and treatment of LTBI and exclusion of active TB in contacts > 5 years of age



IGRA: interferon gamma release assays, LTBI: latent tuberculosis infection, TST: tuberculin skin test

[a] Any symptom of TB (see p. 632).

[b] LTBI treatment is not indicated. Provide information about TB, including the importance of seeking care if symptoms develop.

[c] Follow national TB guidelines in investigating TB. People in whom TB is excluded after investigations (including those with fibrotic radiological lesions) can be considered for LTBI treatment.

7.19 Child maltreatment

Primary care providers are in a unique position to recognize child maltreatment and protect the child and support the family. Child maltreatment is common and underrecognized. It includes physical, emotional and sexual abuse, neglect, fabricated or induced illness, and exposure to intimate partner violence. All these forms of child maltreatment can affect emotional, social and physical well-being.

Article 19 of the Convention on the Rights of Child (CRC) affirms the obligation to protect the child from all forms of physical or mental violence, injury or abuse, neglect or negligent treatment, maltreatment or exploitation, including sexual abuse. All countries in the European Region have ratified the CRC.

Universal screening of all children is not recommended. Suspecting and identifying child maltreatment can be difficult. Be attentive to symptoms indicative of child maltreatment, but do not jump to any conclusions without a careful assessment if you notice a single alerting sign.

Neglect

Neglect is the most common form of child maltreatment. Neglect is present if the child or adolescent does not receive the age-appropriate emotional care or necessities for life such as food, clothing or hygiene. Neglect includes physical, emotional, educational or medical neglect or lack of supervision (in young children).

Alerting signs may include:

- Caregivers who repeatedly miss the child's medical appointments or fail to provide prescribed treatments
- Faltering growth or malnutrition due to inappropriate diet
- Persistently poor hygiene
- Lack of supervision (in young children), abandonment
- Poor school attendance
- Failure to provide a safe living environment
- Emotional unavailability and unresponsiveness from the caregiver.

Physical abuse

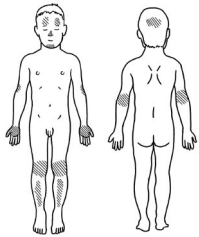
Physical abuse describes injuries to the body which may be caused by being beaten, kicked, pushed or struck with an object. It may also include injuries sustained from burning. Consider physical abuse for any serious or unusual injury with an absent or unsuitable explanation.

Corporal punishment is prohibited by law in many countries.

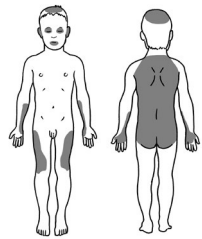
Alerting signs may include:

- **Any** injury to a child especially if they are young, not walking or crawling
- Injury in the anogenital region (see Sexual abuse, p. 639)
- Multiple injuries in different stages of healing, patterned injuries, injuries in unusual locations, unexplained bruises, fractures, burns, abdominal trauma
- Physical punishment reported or used during the visit.

Distinguishing physical abuse and unintentional injuries can be difficult. Bruises as a consequence of simple accidents are common once children start to move around independently. However, locations of bruises and injuries tend to follow different patterns (see illustration).



Typical locations of unintentional injuries



Locations of injuries that may indicate maltreatment

Abusive head trauma in infants ("shaken baby syndrome")

Form of physical abuse which is caused by violent shaking of the child (< 3 years) usually by the parent or caregiver.

Alerting signs may include:

- Altered mental status: irritability, lethargy, coma
- Seizures
- Vomiting
- Apnoea, abnormally slow and shallow respiration.

▶ Provide emergency treatment (p. 716).

▶ REFER immediately any infant with suspected shaken baby syndrome.

Emotional abuse

Emotional abuse can be as prevalent as physical abuse and is often not detected. Emotional abuse includes:

- Hostility, shaming, rejection or scapegoating
- Threats to injure, kill or abandon the child
- Inappropriate methods of disciplining, e.g. punishment for wetting
- Not providing stimulation or education for the child
- Emotional unavailability of parent or caregiver.

Alerting signs include:

- Sleep problems including bed-wetting or soiling
- Frequent (real or imagined) physical complaints
- Signs of anxiety and depression
- Emotional indifference towards friends and family.

Sexual abuse

Sexual abuse happens if the child or adolescent is involved in sexual activities under the age of sexual consent, which he or she may not fully comprehend or not be developmentally prepared. Sexual abuse may occur without physical force, but through psychological, emotional or material manipulation – often by a family member or friend.

Alerting signs include:

- Itching, bruises, lacerations, redness, swelling or bleeding in the anogenital area

- Urinary tract infection, blood in urine or faeces, painful urination
- Pregnancy or STI (especially if < 16 years)
- Fear of a certain person or place
- Prepubertal child displays sexualized behaviour, e.g. sexual talk, requests to be touched in the genital area.

Fabricated or induced illness

Fabricated or induced illness ("Munchausen by proxy") refers to a state in which a parent or caregiver deliberately induces symptoms of illness in the child or exaggerates or lies about symptoms.

Alerting signs include:

- Symptoms only (re)appear or are reported when the parent or caregiver is present
- New symptoms are reported as soon as previous ones resolve
- Unusual attendance at medical services
- Inexplicably poor response to prescribed treatment
- Multiple opinions are sought from other physicians.

Assessment of child maltreatment

If findings suggest maltreatment or if the child confides in you:

▶ Ensure that a specialist performs the forensic investigation for legal purposes: ask the specialist to visit you or accompany the child to the specialist. DO NOT simply refer the child, as you are the child's person of trust especially following a disclosure.

▶ Avoid additional trauma and distress: the child should not repeatedly have to tell the story or undergo a second examination.

▶ Involve the child in decision-making and seek informed consent according to age and developing capacities. Explain the consent process, including confidentiality and when you need to share specific information.

In the event of disclosure:

▶ Commend the child or adolescent for making the disclosure.

▶ Make it clear that they are believed and not at fault.

▶ Reassure them that you will take appropriate action and explain the steps you will take.

History

- Make the child feel comfortable
- Talk to the child or adolescent alone
- Be aware that children and adolescents may communicate their abuse indirectly through their behaviour and appearance
- Ask in a nonleading way and seek an explanation from the child or adolescent for symptoms that may be caused by child maltreatment
- Ask caregiver about symptoms and findings and explore the course of the accident, e.g. how did the accident happen exactly? Where did the child fall from?
- Determine whether the course of the accident provides an adequate explanation for the physical findings.

Examination

Child maltreatment might not present with physical findings. No emotional state is indicative of maltreatment.

- Offer the child or adolescent to choose the gender of the examiner
- Perform the examination with another adult present in the room
- Avoid examination instruments and positions that cause physical discomfort or stress
- Prior to each step of the examination, explain what you are going to do and ask for consent.

When sexual abuse is suspected:

- Look for signs of STIs and perform laboratory tests for STIs (p. 688)
- Perform HIV testing before starting HIV post-exposure prophylaxis (p. 686)
- Offer a pregnancy test to girls who could be pregnant.

DO NOT perform a "virginity test" or "two-finger test". It is unnecessary and inappropriate.

DO NOT examine the vagina or rectum digitally or with a speculum or anoscope.

Documentation

Documentation is crucial to protect children who have experienced maltreatment:

- Document history and physical examination accurately and document the child's emotional state.
- Transcribe all statements from the child and nonoffending caregiver word for word.
- Consider taking photographs or videos, after seeking informed consent. Explain how the materials will be used.
- Handle all information confidentially and securely.

Management of child maltreatment

Protecting child's safety

The highest priority in any action taken should be the safety, health and well-being of the child or adolescent.

- ▶ Consider all potential harms and only take actions that minimize negative effects on the child or adolescent.

Reporting child maltreatment

- ▶ Be aware of any legal requirements in your country to report confirmed or suspected maltreatment.
- ▶ Resist psychological barriers to reporting, e.g. close relationship with caregiver.
- ▶ If there is no functioning legal or child protection system or if reporting may harm the child, balance the need to comply with reporting requirements and the child's best interest.
- ▶ Inform the child of any mandatory reporting requirements.

Child protection services

- ▶ Involve child protection services if:
  - — The child is at risk of further harm
  - — The perpetrator is a caregiver or a close contact
  - — The child or adolescent wants separation
  - — The nonoffending caregiver is unable to support the child.
- ▶ For less severe forms of child maltreatment (mild neglect) and if the child or adolescent wishes to remain with the family, organize support for the family to improve the caregiver–child relationship including psychosocial support, skill training and parenting.

Management following physical abuse

- Prioritize immediate medical needs.
- Treat physical injuries and other consequences of maltreatment such as malnutrition or failure to thrive (p. 511).
- Assess developmental milestones, since physical abuse in young children may cause developmental difficulties (p. 565) or disability (p. 562).

Management following sexual abuse

HIV and STIs

- Provide post-exposure prophylaxis for HIV (p. 686) in the event of oral or genital contact with the perpetrator's genitals if still within 72 hours of the incident. For HIV diagnosis see p. 623.
- Provide post-exposure prophylaxis for other STIs (p. 688) or treat STIs if symptoms are present (p. 688).
- Offer hepatitis B and HPV vaccination to girls aged 9–14 years as per national guidance if not already vaccinated or if vaccination status is unknown. Give HPV and hepatitis B vaccines at the same time but at different injection sites using separates syringes.

Pregnancy

- Provide emergency contraception to girls who have been sexually abused involving penovaginal penetration and who present within 120 hours (p. 693).
- If a confirmed pregnancy occurs as a result of sexual abuse: offer safe abortion to the full extent of the law. If the pregnancy is too advanced for abortion, provide and ensure support throughout the pregnancy and delivery, and discuss other options with the girl such as adoption.

Provide emotional and psychosocial support

Children and adolescents who have experienced child maltreatment may have various emotional and behavioural problems such as:

- Anxiety (p. 534), depression (p. 526)
- Risk of suicide, self-harm (p. 530)
- Alcohol and drug-abuse (p. 649)
- Somatic symptoms
- Behavioural problems (p. 645)

- Post-traumatic stress disorder: "flashbacks" and nightmares related to the traumatic event, irritability or seeking isolation within the first months of the traumatic event.

▶ Avoid psychological debriefing to reduce the risk of post-traumatic stress, anxiety or depressive symptoms.

▶ Offer referral to psychological services for cognitive behavioural therapy and individual psychotherapy (not group therapy) and counselling.

▶ In the event of post-traumatic stress disorder: avoid reminders of the traumatic event and refer for cognitive behavioural therapy with a trauma focus and individual psychotherapy (not group therapy).

DO NOT prescribe drugs for anxiety or depression.

Interacting with caregivers

Good interaction with caregivers will influence outcomes for and safety of the child. Interaction may be complicated by the fact that the caregiver may be the perpetrator or have allowed the maltreatment and felt powerless to stop it.

▶ Encourage active engagement and participation in the child's care, whenever safe.

▶ Avoid blaming or stigmatizing caregivers.

▶ Explain the potential implications of abuse or neglect for the child.

▶ Explain limitations of confidentiality and obligations to report.

▶ Recognize urgent needs of caregivers: refer to psychological services for acute emotional and psychosocial support, if needed.

▶ Consider interventions that promote caregiver–child relationships, including skills training for caregivers and parenting and home-visiting programmes.

Follow-up

Follow up concerning:

- Long-term emotional and behavioural consequences and psychological interventions
- Physical injuries and adequate healing
- Consequences of maltreatment (e.g. malnutrition or failure to thrive)
- Development (developmental milestones, p. 62).

Assess whether:

- Maltreatment is continuing or recurring
- The form of maltreatment has changed, e.g. no physical maltreatment but emotional abuse instead.

7.20 Emotional and behavioural problems

Emotional and behavioural problems may be reported by parents or caregivers, self-reported by the child or adolescent, or observed during the assessment process.

Primary care professionals have a crucial role in identifying children with behavioural or emotional disorders.

Common presentations of children with emotional and behavioural problems in the primary health care setting include:

- **Children or adolescents** presenting with physical complaints such as problems with development, emotions or behaviour, e.g. inattention, overactivity, or repeated disobedient and aggressive behaviour.
- **Parents or caregivers** with concerns about the child or adolescent's behaviour, e.g. too active, aggressive, frequent or severe tantrums, refusing to participate in activities or go to school.
- **Teachers** with concerns about a child or adolescent, e.g. easily distracted or disruptive in class or difficulty completing schoolwork.
- **Community health or social workers** with concerns about a child or adolescent, e.g. rule- or law-breaking behaviour or physical aggression at home or in the community.

Behavioural (conduct) problems

Behavioural problems are common in children and adolescents. They may result from temporary stressors in the child's life or represent more enduring disorders. Some children have extremely difficult and challenging behaviours that are outside the norm for their age. Boys are more likely than girls to suffer from behavioural disorders. Common behavioural problems include:

- Oppositional defiant disorder (p. 540)
- Conduct disorder (p. 540)

- Attention deficit hyperactivity disorder (p. 571)
- Autism spectrum disorder (p. 569).

Common symptoms of behavioural problems

- Excessive overactivity: excessive running around, extreme difficulties remaining seated, excessive talking or moving restlessly
- Excessive inattention, absent-mindedness, repeatedly stopping tasks before completion and switching to other activities
- Excessive impulsivity: frequently doing things without forethought
- Repeated and continued behaviour that disturbs others, e.g. frequent and severe tantrums, cruel behaviour, persistent and severe disobedience, stealing
- Sudden changes in behaviour or peer relations, including withdrawal and anger.

Emotional problems

Emotional problems and disorders occur in children of all ages and are characterized by increased levels of anxiety, depression and fear, and often manifest as somatic symptoms. They may go unrecognized until early adolescence. They include:

- Depression (p. 526), suicide or self-harm (p. 530)
- Anxiety (p. 534)
- Eating disorders (p. 552)
- Sleep problems (p. 546)
- Substance-related disorders (p. 649)
- Stress-related disorders
- Dissociative disorders
- Somatic symptom disorders (p. 557)
- Schizophrenia (p. 545).

Common symptoms of emotional problems by age

- **< 5 years:** excessive crying, difficulty in separating from parents; soiling behaviour; diminished initiation of play and social interaction with peers; sleeping and eating difficulties.

- **6–12 years:** recurrent, unexplained physical symptoms (e.g. stomach ache, headache, nausea); reluctance or refusal to go to school; extreme shyness; new wetting or soiling behaviour.
- **13–18 years:** problems with mood, anxiety or worry; difficulty concentrating, poor school performance, often wanting to be alone or stay home.
- **All ages:** extreme fear, anxiety or avoidance of specific situations or objects (e.g. separation from caregivers, social situations, certain animals or insects, heights, closed spaces, sight of blood or injury); changes in sleeping and eating habits; diminished interest or participation in activities; oppositional or excessive attention-seeking behaviour.

Management

Provide psychoeducation and support to the child or adolescent

- Explain that emotional problems are common and can happen to anyone: they may cause unjustified thoughts of hopelessness and worthlessness which are likely to improve with good support.
- Counsel that if they have thoughts of self-harm or suicide, they should tell a trusted person and return for help immediately.
- Consider providing training in breathing exercises and progressive muscle relaxation.

For excessive and unrealistic fears:

- Acknowledge the child or adolescent's feelings and worries.
- Give small rewards when they try new things and praise the child.
- Encourage and help the child to face the feared situation one step at a time, e.g. if the child is afraid of separating from the caregiver, encourage the child to gradually increase the amount of time spent playing alone.
- Create a plan together to help the child or adolescent to cope with a feared situation.
- Connect the child to peers who are supportive, or to trustworthy online resources.

Provide psychoeducation and parenting advice to caregivers or parents

- Explain that the child should not be blamed for the problem.
- Explain that caring for a child with an emotional and behavioural problem or disorder can be challenging but also very rewarding.

- Praise the caregivers for their efforts and sacrifices.
- Help caregivers to have realistic expectations.
- Counsel on how to support their child's mental health (p. 112).
- Assess the psychosocial impact of the child or adolescent's problem or disorder on the caregiver, and offer psychosocial support.
- Support the family to handle social and familial problems:
  - Address any stressful situation in the family such as an emotional or behavioural problem in the family
  - Help them identify strengths and resources
  - Promote necessary support and resources for family life, employment, social activities and health
  - Arrange for a trustworthy carer to assume care for a short period to give the primary caregiver a break
  - Encourage them to contact other caregivers facing similar dilemmas for mutual support.

Liaise with teachers and adults who look after the child

- After getting consent from the child or adolescent and caregiver, contact the teacher concerned.
- Explain that the child or adolescent's mental problem is affecting their learning, behaviour or social participation and that there are things the teacher can do to help.
- Provide advice and explore strategies to help engage the child in school activities and facilitate learning, inclusion and participation.
- If the child is being bullied, advise on appropriate action to stop it.
- If the child or adolescent has been out of school, help them return as soon as possible by gradually stepping up the reintegration schedule. During the reintegration period, avoid quizzes and exams.

7.21 Substance use and abuse

Adolescence is a time of experimentation. Many adolescents experiment with tobacco, alcohol and other substances (plant-based hallucinogens, artificial hallucinogenic, "recreational" compounds, inhalable volatile compounds). They may do this for different reasons: to experiment with new sensations, to feel and act older, to fit in with friends, to bond socially, to challenge adults or to relieve stress. Some adolescents use substances to cope with social difficulties or mental problems (e.g. anxiety, sleep problems). Although use of alcohol and tobacco is socially accepted as normal, these substances have known risks and negative health consequences. The aim is to avoid tobacco use (inhaled, sniffed or chewed), as it is highly addictive and detrimental and to achieve non-use of other substances. Even if alcohol use is culturally appropriate and legal from a certain age, alcohol use should be limited. Less is better.

RED FLAGS

- Recurrent requests for psychoactive medications including analgesics
- Injuries
- Rare: infections (HIV/AIDS, hepatitis C).

Nonspecific symptoms (may also indicate mental health problems):

- Going out late at night
- Violence and aggression
- Isolation
- Out-of-control behaviour at home
- Sleep problems, fatigue
- Dropping grades and school absenteeism
- Money problems.

History

Adolescents using, misusing or abusing substances usually do not spontaneously report their habit and related problems. Take any visit as an opportunity to inquire about substance use. Talk to the adolescent alone. Respect privacy and confidentiality. Assess competence and obtain consent (p. 666).

Review the adolescent's lifestyle (see HEADSSSS assessment, p. 670). Additionally assess:

- Reason for the consultation and who prompted it (often not the adolescent): parents, school nurse, police, social worker
- Type of substance (often several): start, frequency, amount; use increasing, decreasing or steady. Identify the types of substance use behaviour (Table 110).
- Feelings about substance use
- Motivation to modify use; and if yes, when and how
- Harmful behaviours: debt, theft, truancy, way of acquiring the substance
- Underlying problems such as depression and anxiety.

Adolescents often move from one type of use to another, in either direction (towards more serious or towards less harmful use).

Table 110. Types of substance use behaviour

Mode of use	Characteristics
Abstinence	No substance use at all
Experimental use	• Typical of early adolescence; transient experimentation with a new substance • User lacks experience to anticipate drug effects (e.g. getting drunk) • Potential harm: injuries, violence, unplanned or unsafe sexual experience, ethylic coma, "bad trip" or adverse experience.
Recreational use (occasional use)	• Occasional use of substances, not every week, on specific occasions, no medium-term harmful impact • Potential harm: same as for experimental use.
Problematic use (misuse, hazardous use)	• Frequent use, e.g. every weekend or every day • Risk taking, e.g. drunk driving, binge drinking • Often linked with potential or actual impact on the adolescent's life, e.g. harmful or disruptive behaviour, injuries, bad school grades, spending or stealing money, withdrawing from peers and family, violence, ethylic coma.

Mode of use	Characteristics
Substance use disorders	• Unsuccessful attempts to quit or control use • Spends a lot of time getting the substance • Develops tolerance (more substance needed to get desired effect) and withdrawal symptoms relieved only by the substance (physical dependence) • Harmful consequences on many aspects of life: bad school grades, failure in acquiring professional skills, poor social and family life, violence, financial debts, physical and psychological problems.

Investigations

DO NOT routinely perform urine testing. It is not helpful and may negatively impact the doctor–patient relationship.

Management

Substance misuse requires a careful assessment and management depending on the mode of use (Table 111).

Table 111. Management of substance use or abuse

Mode of use	Management
Exploratory use **Recreational use**	• Provide motivational interviewing (p. 671).
Problematic use	• Provide motivational interviewing (p. 671). • Environmental measures: encourage a change in the adolescent's environment and activities rather than focusing on the adolescent's behaviour as the only problem. • Provide psychological support. Consider longer-term psychosocial treatment for adolescents with ongoing problems related to their substance use if they do not respond to the initial brief interventions.
Substance use disorder	• Environmental measures (as above) • Refer for cognitive behavioural therapy and individual psychotherapy • Refer for family therapy • Treat withdrawal symptoms, if any • Consider institutional care.

DO NOT only offer mere advice and warnings to adolescents on the risks of taking drugs.

- Address the issue of social or peer pressure, which may be the source of tension and anxiety, wider exclusion or ridicule.
- Encourage participation in school or work and activities that occupy the adolescent's time, e.g. safe group activities.

Counselling

- Counsel and encourage the parent or caregiver to:
  - Adopt closer surveillance: know where the child is and with whom, what they are doing and when they will be home.
  - Start talking with children already in early adolescence about the use of tobacco, alcohol or other substances, and how they feel about it.
  - Discuss the influence of peers and media and the importance of deciding what is best for themselves.
  - Explain your expectations regarding substance use.
  - Look for signs of substance use: if noticed, discuss the matter, and seek help together from a health worker if needed.
- Counsel and encourage the adolescent to:
  - Reflect on how to react if peers pressure them into using tobacco, alcohol or other substances.
  - Talk to friends, parents or other trusted adults if someone offers them substances to use.
  - Seek help from friends, parents or other trusted adults, if they have started misusing alcohol or other substances.
  - Avoid driving a car, motorcycle or bicycle while under the influence of alcohol or other substances. If they plan to return home, they should find someone sober to drive, take a cab or stay overnight.

Referral

Arrange for detoxification services if necessary or treatment in an inpatient facility in a severe situation, if this is available.

Follow-up

Assess substance use on a regular basis, as modes of substance use change over time.

7.22 Problematic use of internet and social media

The use of internet and social media – known as information communication technologies (ICTs) – has become an integral part of everyday life of children and adolescents around the world. It is not only the amount of time spent on the internet and social media that marks the difference between recreational or harmful use.

History

Talk to the adolescent alone. Respect privacy and confidentiality.

Remain nonjudgemental and ask the child or adolescent to reflect on:

- How they use ICTs, and for what purposes
- The amount of time spent using ICTs
- The impact of ICT use on family life, school grades, health, sleep, physical activity and relations with peers
- The positive and negative aspects of their online behaviour.

Assess whether the use is recreational or problematic:

Recreational use includes the continuation of sports and social activities while enjoying the positive aspects of ICTs, e.g.:

- A stimulating and enjoyable tool
- A resource for information, counselling, seeking advice
- An information device for schoolwork
- A means for connecting and communicating
- For some, contact with peers living with similar chronic conditions or in similar difficult situations
- A window on the world and society and for discovering new areas of interest.

Problematic use of ICTs can be both a sign of worsening mental health and a potential cause of mental health problems.

RED FLAGS

Problematic ICT use linked to harmful activities:

- Posting and exchanging sexist and racist opinions
- Accessing websites with brutal, violent or pornographic images
- Boasting of illicit activities or self-harming behaviour
- Cyberbullying: bullying through internet or social media
- Sexting: sending or receiving sexually explicit messages, pictures or videos
- Grooming: establishing an emotional connection with an adult whose aim is to engage in child pornography or sexual abuse, or lure minors into illicit exhibitionism or prostitution.

Potentially health-threatening effects of internet use:

- Fatigue, sleeping problems (use of screens or mobile devices late at night)
- School and grade failure
- Spending more time online and less time with peers or family and on real-life social and sports activities leading to isolation
- Conflicts with parents around the use of ICTs
- Psychological symptoms (e.g. due to bullying)
- Change in eating patterns (eating junk food while using ICTs)
- Obesity or backache linked with physical inactivity
- Addiction.

Management

- Educate the child or adolescent about the benefits and drawbacks of ICT use and about alternative ways to connect with others.
- Encourage the child or adolescent to talk to a trusted adult if they think they are being scammed, groomed, bullied, subject to identity theft or receiving inappropriate content (abuse, violence).
- Counsel on the recommended maximum recreational screen time by age (p. 103).
- If misusing ICTs:
  - Use motivational interviewing (p. 671) to help modify the habit.
  - Consider setting up a discussion with parents to help them find a compromise.
- Counsel the parents or caregivers to:

— Monitor use regularly. Until the age of 14 or 15, they should generally know why and how their child uses the internet and social media.
— Ideally, until this age, children should not have their own computer in their room.
— Adopt an open attitude and negotiate ICT use, while allowing the child some autonomy.
— Familiarize themselves with ICTs and ask the child to show them how they play with their smartphone or computer: this makes discussing the topic easier.

Follow-up and referral

Monitor the situation over time. Severe ICT use addiction is often linked with underlying mental health problems (like substance use disorder), and usually needs psychotherapeutic support and whole-family intervention with a trained specialist.

7.23 Palliative care needs

Palliative care is the total care of the child's body, mind and spirit and helps patients to live as actively as possible until death. It applies not only to children in their last days of life but to all children living with the long-term physical, psychological, social or spiritual sequelae of serious, complex or life-limiting illnesses. It begins early in the diagnosis and provides support for the patient and family throughout the course of the illness, including support for bereaved family members after the child's death.

Children with a wide range of health conditions require palliative care:

- Malignancies: after treatment failure, leukaemias with haemorrhage due to coagulopathies, brain tumour
- Congenital conditions or anomalies, i.e. dysfunction of a vital organ, prematurity with respiratory distress, birth asphyxia with brain injury, neurodevelopmental disability
- Injuries: severe head trauma, burns
- Serious infections: HIV/AIDS, drug-resistant tuberculosis, meningitis
- Genetic conditions (trisomy 13 and 18)
- Malnutrition.

Identify early any suffering due to serious or life-threatening illness or injury.

Management

Delivering palliative care for children and adolescents requires a broad multidisciplinary approach that includes the family and makes use of available community resources, even when resources are limited. It can be provided in hospitals, community health centres and the child's home. Children with life-limiting or life-threatening conditions and their families have a range of specific needs that may differ depending on the condition.

The goal of palliative care is to achieve the best quality of life for patients and their families.

Care coordination

- Coordinate care with the multidisciplinary team and refer to specialists (palliative care specialist, physical therapist, psychologist) when needed, to ensure optimal management of symptoms and psychological, emotional and spiritual support.
- Organize adaptations for the home and equipment to improve mobility (e.g. wheelchairs). Assess the need of moving to more suitable housing to reduce the burden on the family.

Ensure good communication with children and their families

- Disclose the child's prognosis to the family in a private face-to-face discussion.
- Be honest and open: reassure and maintain hope but do not raise false expectations.
- Communicate according to the child's developmental stage.
- Listen to the family and child. They may have concerns about the future, treatment, siblings, costs and difficulties of hospital stays.
- Address their understanding of the illness, and their fears and concerns. Families may ask: "Is this my fault?" "What if we had gone for treatment earlier?" A child may wonder: "How will my parents cope?" A sibling may imagine: "I caused this to happen when we argued and I wished him dead."
- Address misconceptions about illness.
- Explain the disease and its treatment, the need for frequent blood tests and investigations and the importance of follow-up.

- Offer choices for the place of care and death.

Emotional, psychological and spiritual support

While some may find it reassuring to talk about their beliefs and values, others find it difficult, especially at the end of life.

- Provide emotional, psychological and spiritual support to the child, parents and siblings throughout the course of the disease and during the mourning process after the child's death.
- Identify children who are suffering existentially and spiritually. Provide early and adequate support, e.g. link with support groups.
- Reassure parents that it is good to accept help from the wider family or the community when caring for their child. Siblings also need their support, love, attention and time.

End-of-life care

The art of end-of-life care is knowing when both goal and treatment must change and setting realistic but varying goals. Goals change as disease progresses: initially there may be hope of cure but as the disease advances the family hopes instead for comfort and good quality of life, however short it may be. Help the child enjoy and cope with what is left of their life. A dying child needs access to siblings and friends to play with and talk to: they should be made welcome.

Support parents or caregivers in relation to their child's death

- Discuss all the practical arrangements that will be needed after their child's death and provide them with written information on matters such as:
  - Care of the body
  - Relevant legal considerations (involvement of the coroner and child death overview panel, death registration)
  - Funeral arrangements
  - Postmortem examination (if this is to be performed).
- Plan and provide bereavement support for the family.
- Make a bereavement follow-up plan as needed.

Managing hydration and nutrition

Enteral tubes and intravenous fluids may have a significant effect on care. They may be a burden for children and adolescents, and may mean the place of care and death change.

- Discuss how to manage fluid and nutritional needs with the child and their parents or caregivers.
- Encourage the child or adolescent to drink and eat whenever they wish.
- Provide lip and mouth care.
- If a child or adolescent cannot drink, discuss whether it is in their best interests to start or continue enteral tube feeding or IV fluids.
- Nasogastric tube feeds or IV infusions are unpleasant and should only be used if the symptomatic benefit outweighs the discomfort.
- Regularly review the decision to continue enteral tube feeding or IV fluids or nutrition with the child and family.

Managing common symptoms

Prevent and relieve the most common symptoms associated with serious or life-threatening illness or injury:

- Regularly assess for common symptoms associated with serious or life-threatening illness or injury.
- Manage and adjust treatment to enable children to stay at home (see following pages).
- Review if all prescribed drugs are still necessary, as they often cause side-effects. Treat orally, whenever possible.
- Treat the treatable: the disease itself may be causing symptoms, e.g. nerve pressure, intestinal or bladder obstruction, that will respond to chemotherapy.
- Provide patient-centred care: recognize which are the most important symptoms and concerns for the child or adolescent.
- Ask the child and parents or caregivers to make a list of all the symptoms and medication-related problems to guide treatment.

Pain

The child should be free of pain when moving and resting.

- Assess and treat mild, moderate and severe pain (p. 507).
- Advise on nonpharmacological methods of controlling pain (p. 510).
- Consider the following causes of pain and distress that may have been overlooked, particularly in children who cannot communicate:
- Neuropathic pain (associated with cancer)
- Gastrointestinal pain (due to diarrhoea or constipation)
- Bladder pain (due to urinary retention)
- Bone pain (associated with metabolic diseases)
- Pressure ulcers
- Headache (due to raised intracranial pressure)
- Musculoskeletal pain (due to neurological disabilities)
- Dental pain.

Nausea, vomiting

- Treat the underlying cause first.
- Give haloperidol (oral, IV or SC, p. 827). Other options are fluoxetine (or other selective serotonin reuptake inhibitors, e.g. sertraline or citalopram), diphenhydramine, metoclopramide, acetylcholine antagonists, corticosteroids, and low-dose benzodiazepine.

Constipation

- Provide dietary advice and promote adequate hydration.
- Give a laxative (see dosages in Annex 4):
  - Infants 1–12 months: iso-osmotic laxative (polyethylene glycol) or lactulose
  - Children: iso-osmotic laxative (polyethylene glycol) or lubricant (paraffin oil). Do NOT give paraffin oil to children at risk of aspiration, e.g. gastroesophageal reflux disease, swallowing impairment
  - Low gastrointestinal motility, e.g. bedbound patients, neurodegenerative disorders or due to medication: stimulant laxative (bisacodyl or senna)

- At the start of morphine treatment: stimulant laxative (bisacodyl or senna) and stool softener (lactulose, sorbitol or polyethylene glycol).

- Treat anal fissures with topical petroleum jelly for pain relief.

Respiratory distress, breathlessness or noisy breathing

- Counsel on breathing exercises.
- Assess and manage underlying cause:
  - For secretions and anxiety see below
  - Physical discomfort: determine the cause (e.g. position) and improve if possible
  - Environment: create a calm and quiet atmosphere, adjust the temperature, use a fan to cool the face
  - Thick mucus: give nebulized saline (0.9% NaCl)
  - Medical conditions, e.g. pneumonia, heart failure, sepsis or acidosis: consider appropriate treatment, e.g. inhaled corticosteroids, bronchodilators and mucolytic drugs for bronchial obstruction.
- If dyspnoea causes discomfort, especially at the end of life, give morphine (not nebulized) and benzodiazepine. Consider giving oxygen.
- Consider referral to a physiotherapist.

Cough

- Counsel on breathing exercises, try different postures (coughing while standing or sitting may be more effective).
- Consider:
  - Inhalation of physiological saline (0.9% NaCl)
  - Dextromethorphan or noscapine
  - Morphine if coughing causes discomfort
  - Referral to physiotherapy for productive coughing.

Secretions or rattling

- Consider:
  - Repositioning (putting the patient on their side)
  - Airway suctioning
  - Physiotherapy
  - Antisecretory drugs such as hyoscine butylbromide.

Bleeding and anaemia

Management depends on the severity and underlying cause and can include desmopressin, tranexamic acid, vitamin K, fresh frozen plasma or recombinant factor VII.

- Nose bleeds: local xylometazoline (see Annex 4, p. 845) or refer to ENT for local coagulation
- Anaemia (Hb < 5.0 g/dL): blood transfusion.

DO NOT give vitamins, nutritional supplements or erythropoietin.

Pruritus

- Cool the skin.
- Consider diphenhydramine (or other antihistamines, e.g. dimenhydrinate, chlorpheniramine, cyclizine) or fluoxetine (or other selective serotonin reuptake inhibitors, e.g. sertraline or citalopram) (see dosages in Annex 4).
- Further management depends on the underlying cause.

Seizures

- Treat or remove any potential cause or trigger, e.g. fever, electrolyte imbalance, drug reactions, sleep deprivation, pain, excessive environmental stimulation.
- Ensure that caregivers know how and when to use anticonvulsants (such as buccal midazolam) if the child has a seizure at home (see Chart 12, p. 727).

Fatigue, weakness

- Treat underlying causes and comorbidities, e.g. anaemia, dehydration, malnourishment, asthma, infection, depression.
- Stop medications causing fatigue as a side-effect.
- Encourage bedbound children to get out of bed regularly.
- Consult a physiotherapist for an exercise programme and a psychologist for psychotherapy or support.

Sleeping problems

- Encourage a regular sleep-wake rhythm and avoid stimulants.
- Counsel on a regular sleeping routine and methods for relaxation.

- Consider melatonin (see dosages p. 830) or short-acting benzodiazepine treatment (clonazepam) for sleeping disorders.

Anxiety, depression, existential and spiritual suffering

- Calm speaking, reassurance, relaxation and distraction techniques, breathing techniques and guided imagery.
- Consider anxiolytic agents (e.g. lorazepam or midazolam), fluoxetine (or other selective serotonin reuptake inhibitors e.g. sertraline or citalopram), amitriptyline.
- Provide psychological, emotional and spiritual support. Involve a psychologist or spiritual caregiver of the family's conviction, as appropriate.

Agitation or confusion, delirium

- Identify and if present treat any medical or psychological conditions.
- Provide reassurance, distraction, physical contact (holding and touching).
- Create a calm and comfortable environment: calm speaking, reduce noise and lighting, comfortable room temperature, familiar objects, people, relaxing music.
- Offer religious and spiritual support if requested.
- Consider haloperidol or benzodiazepines (midazolam, diazepam or lorazepam). Start at a low dose and increase if necessary (see dosages in Annex 4).

CHAPTER 8

Adolescent health

This chapter covers **conditions specific to adolescence**. All other conditions occurring in childhood and adolescence can be found in previous chapters of this book.

8.1 Development of the adolescent

Adolescence is the phase of life between childhood and adulthood, from ages 10 to 19. It is a unique stage of human development and an important time for laying the foundations of good health.

Adolescents experience rapid physical, cognitive and psychosocial growth. This affects how they feel, think, make decisions and interact with the world around them. This phase is characterized by specific needs and makes health care particularly challenging for all health professionals.

Adolescence can be divided into three major phases (see Table 112):

- Early adolescence is focused on growth and pubertal changes.
- Middle adolescence is marked by a search for privacy and autonomy from parents or caregivers.
- In the later phase the adolescent acquires a more stable identity and improved performance in higher-order cognitive processes such as planning and critical thinking.

The brain undergoes a process of maturation during adolescence, which enables the adolescent to think in a more abstract, complex and faster manner. Brain development and the ability to understand the consequences of one's decisions or actions continue maturing into early adulthood.

Keep in mind:

- Not all adolescents progress at the same pace. Adolescents of the same age can be at very different stages of their biopsychosocial development.
- Physical maturity is not synonymous with psychosocial maturity.
- Each adolescent must be seen and cared for as a unique individual, and each aspect of his or her biopsychosocial development assessed in its proper terms.

Table 112. Stages of adolescent development

	Early (10–13 years)	Mid (14–16 years)	Late (17–19 years)
Physical	**Girls:** breast buds and pubic hair develop (Tanner stage 2); initiation of growth spurt; menarche (Stage 4).	**Girls:** mid-to-late puberty (Stage 4–5); completion of growth, menarche (Stage 4); development of female body shape with fat deposition.	Further brain transformation; Progression of bone mineral accretion
	Boys: testicular enlargement; beginning of genital growth (Stage 2).	**Boys:** mid puberty (Stage 3–4); spermarche and nocturnal emissions; voice breaking; initiation of growth spurt (Stage 3–4).	**Boys:** completion of pubertal development (Tanner 5); continued androgenic effects on muscle bulk and body hair.
Psychological/ cognitive	Thinking remains concrete with development of early moral concepts; development of sexual orientation.	Emergence of abstract thinking; growing verbal abilities; adaptation to increasing educational demands.	Complex abstract thinking; increased impulse control.
Social	Self-realization of difference from parents and beginning of strong peer identification; early exploratory behaviour.	Emotional separation from parents and strong peer group identification; challenges authority; exploratory/risk-taking; sexual interests develop; early notion of vocational future.	Development of social autonomy; intimate relationships; vocational capability.

8.2 Competence, consent and confidentiality

When caring for adolescents the following three principles enshrined in the United Nations Convention on the Rights of the Child (p.4) need to be considered:

- **Assess competence:**

  Competence is a legal concept that grants the right to make an autonomous decision (i.e. a decision taken without third-party authorization, i.e. from parents or guardians). While competence is a legal concept, capacity is a clinical concept. It is defined as the ability of an individual to form an opinion and make an informed and autonomous decision, notably in respect of health and health care. Children and adolescents' decision-making capacity develops with age: as they mature cognitively they can begin to make autonomous decisions regarding more complex issues. Some countries set an age limit for the competence of minors (often at 14, 15 or 16 years), but others leave the assessment of competence to the health care provider. In some instances, a provider can even declare an adolescent competent to make a decision in his or her own best interest before the adolescent attains the age defined by national laws as that of legal competence.

  - Be aware of your country's legal framework concerning health care.
  - Establish an empathetic relationship with the adolescent.
  - Assess the adolescent's competence and decision-making capacity. Evaluate the adolescent's ability:
    - To understand different aspects of the given situation
    - To choose between different options, and appreciate their differences
    - To understand the outcomes resulting from different decision(s).
  - Reassess the adolescent's cognitive skills regularly, as they may develop from one encounter to the next.

- **Obtain consent:**

  Consent relates to the formally expressed (usually written) agreement or permission for any health intervention, such as vaccination, elective surgery, choosing or terminating a treatment. Even when the adolescent

is considered insufficiently mature to be granted full decision-making capacity, their opinion and approval of any decisions made on their behalf by parents/caregivers has to be sought: this process is called "assent".

- Involve the adolescent actively in any decision regarding his or her health and treatment.
- Provide materials explaining the decision and make sure the adolescent has understood all possible consequences ("informed consent").
- Discuss all aspects of the situation and review any decisions that will have to be made.
- Accept the adolescent's treatment preferences as far as possible, especially for chronic conditions.

Ensure confidentiality:

Many adolescent patients will not disclose information regarding sexuality, substance use or risk-taking unless they know that the provider will keep the information confidential. It is therefore very important to ensure confidentiality. If there is a direct threat to the life of the patient or others, e.g. in child maltreatment, medical confidentiality may be limited.

- Respect privacy and maintain confidentiality.
- Know the legal and ethical limits around confidentiality.
- Clarify the confidential nature of the discussion during each visit.
- Explain under which circumstances parents or other adults may be informed.
- Encourage the adolescents to share information with the parents or caregivers.
- Discuss at the end of the consultation which information can be disclosed to the parents or not, and the reasons why.

8.3 Diagnostic approaches to the adolescent

Adolescent health care is unique in view of the importance it gives to supporting individuals in their pursuit of autonomy while providing privacy and confidentiality.

When conducting a history and examination with an adolescent bear in mind the following:

- Balance the adolescent's need to be autonomous with the importance of keeping parents or caregivers involved, especially during early and middle adolescence.
- Adjust the involvement of the parents to the adolescent's stage of development and the adolescent's wishes.
- Counsel adolescents of all ages and their parents or caregivers on the principles of privacy, confidentiality and the need to have moments alone with the adolescent during the consultation.
- The adolescent may present without parents or caregivers (and may refuse to attend with parents). Always listen and support adolescents, even if they present without parents or caregivers. Assess competence (p. 666) and involve caregivers as much as possible.

Taking history

All adolescents at least from the age of 12 **should be seen alone during part of the consultation** to grant them some privacy and support their search for autonomy. Adolescents may be reluctant to disclose information on sensitive matters if caregivers are present.

Start taking the history with a focus on the reason for the visit and initial complaint as disclosed and perceived by the adolescent.

Then, if present, ask what the parents or caregivers make of the situation and about any specific worries or symptoms not necessarily linked with the reason for the visit. In addition, depending on the patient's stage of development and, if time allows, review the patient's health and lifestyle habits in order to address environmental exposure or risk behaviour issues by carrying out a **HEEADSSSS assessment** (p.670).

Respect the following principles to make the adolescent feel comfortable and build a trusting relationship:

DO

- Introduce yourself, greet the adolescent and, if present, each parent or caregiver. Clarify who initiated the consultation and if the adolescent assents to it.
- Ask open-ended questions and listen attentively without interrupting.
- Recognize and acknowledge feelings. It is important to be attentive, interested, genuine and empathetic.
- If the adolescent discloses important and sensitive information, acknowledge the act of trust.
- Use clear, simple language, without technical terms. Make sure that the adolescent understands your message.
- Summarize the information to confirm that it has been correctly understood.
- Adapt your questions to the adolescent's age and development.
- Ask if there are any concerns about body appearance and function, and whether pubic hair, breasts and genitals look "normal".
- Maintain rapport: keep at a comfortable distance initially, make eye contact, stay at the adolescent's level as much as possible.

DO NOT

- Do not start your consultation with too direct questions about intimate issues (e.g. substance use, sexuality, taking risks).
- Do not run the conversation from behind the desk, if possible, and never from above. Instead sit beside the adolescent while leaving some space.
- Do not take notes on your computer while taking the history.
- Do not ask questions that might be interpreted as blame or judgement.

Health promotion and prevention during adolescence should also focus on behaviour and lifestyle: habits acquired during adolescence have a long-term impact on health (nutrition, physical activity, substance use).

The following **HEEADSSSS** acronym is useful to keep in mind when reviewing the adolescent's lifestyle (behaviour, habits and environment) and can help in covering all important aspects (Table 113):

Table 113. HEEADSSSS assessment

Home	• Home environment: where, how and with whom does the adolescent live? Own room? Sharing with siblings?
Education/ Employ-ment	• Grades and interest in school • School environment • Relationship with teachers/peers • Career plans, employment
Eating habits	• Number of meals per day, composition • Special diet, concerns (p. 552)
Activities	• Relationship with peers • Sports, activities, gathering with friends • Sleep (patterns and deviations from needs)
Drugs	• Usual medication • Any consumption, misuse/abuse (p. 649) • Internet, video game or online game addiction
Sexuality	• Sexual and gender identity, orientation, • Sexuality and sex; sexual diversity; safer sex, experiences, fantasies, concerns (p. 679)
Suicide and mental health	• Insomnia, variations in appetite • Low self-esteem • Body image changes or discomfort • Depression (p. 526), anxiety (p.534), suicidal thoughts (p.530)
Security	• Use of protective devices (e.g. belt, helmet) • Risk behaviour (drinking and driving) • Possible abuse and violence • Past injuries
Social media	• Cybersecurity and cyberbullying • Social networks and use of internet, video and online games (p. 653)

Counselling and motivational interviewing

Any consultation with an adolescent presents an **opportunity for preventive counselling or intervention**. Be ready to counsel using motivational interviewing (see below) and assist the adolescent in overcoming problematic health issues or situations.

Tailor any advice regarding lifestyle, medication or other treatment to a young patient's capacity to anticipate its impact on his or her health behaviour. During early adolescence, it may be difficult for an adolescent to comprehend long-term threats to health, e.g. lung cancer links with cigarette smoking.

Use motivational interviewing as a counselling technique when working with adolescents, since it aims to increase personal autonomy and change behaviour by actively involving the young patient in resolving his or her situation. It allows the individual adolescent to define the problem, express concerns and come up with a response.

Key principles of motivational interviewing:

- Listen and show empathy.
- Help the adolescent to identify any changes to be made or issues to be addressed.
- Explore how far (on a scale of 1 to 10) the adolescent feels ready to modify his or her behaviour and what might help to increase the readiness to change.
- Help them see the gap between where they are and where they want to be.
- Do not tell the adolescent what to do, but let the adolescent tell you what needs to change.
- Investigate the pros and cons of changing a behaviour pattern.
- If the readiness for behavioural change is high: agree on concrete, realistic first steps and a time frame for follow-up.
- Give praise and recognition for efforts and progress.
- As far as possible, and only if the adolescent approves, share the result of the discussion with parents and caregivers.

Approach to the adolescent during physical examination

Examine the adolescent without the parent or caregiver being present, if this is the adolescent's wish. Consider having a same-sex health care provider in the examining room. Some parents or caregivers may be reluctant to leave the room. Explain that this is a routine process, which is necessary for their child's best care. Reassure the caregivers that you will provide them with any important information.

- Carry out the examination in a private examination room with a comfortable room temperature.
- Obtain the adolescent's consent (p. 666).
- Explain the nature and purpose of the examination and how you will proceed.
- Let the adolescent participate, e.g. listen to his or her heart sounds.
- Begin with less intrusive examinations (e.g. height, blood pressure) and gradually move on to more intimate or sensitive ones.
- Assess the stage of adolescence in terms of physical and pubertal growth (p. 673), body composition and physical appearance, all of which may have an impact on self-image, self-esteem and mood.
- Be respectful during the examination, reassure when findings are normal, explain about normal variants and clarify issues related to physical growth and development including pubic hair, breasts and genitals.

At the end of the consultation:

- Summarize your thoughts about the complaint or symptoms, and state your diagnosis and next steps, e.g. imaging or laboratory tests, treatment, follow-up.
- Make sure that the adolescent understands and agrees.
- Make sure that parents or caregivers are involved in assessing the situation and follow-up or treatment, while respecting confidentiality.

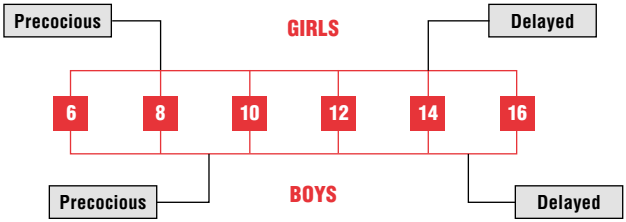
8.4 Adolescent with delayed puberty

As a child becomes an adolescent, the body starts preparing for adulthood. This stage – puberty – lasts for about four to five years and is characterized by:

- A growth spurt, with a gain of ~ 20–25 cm over this period
- Increase in musculature (especially boys) and fat tissue (especially girls)
- Appearance of body hair and of acne for some
- Development of sexual organs, with the acquisition of fertility.

The menarche (first menstrual periods) is an important physiological and psychological landmark for girls, while boys experience the first emission of sperm. Not all adolescents develop at the same pace: some begin their puberty at age 8 or 9 while others start only at age 13 or 14. Girls begin their puberty earlier than boys. Fig. 6 illustrates the normal range for the beginning of puberty:

Fig. 6. Age ranges for the onset of puberty



Puberty assessment and delayed puberty

Growth and the process of puberty can be impacted by:

- Long-term chronic diseases
- The age at which one or both parents experienced puberty
- Undernutrition or overweight and obesity.

History

Talk to the adolescent alone. Ensure the protection of privacy and confidentiality. Assess competence (p. 666). Obtain consent (p. 666).

- Age and age at which the parents started puberty
- Growth development during childhood
- Development of hair on or near the genital area
- Menarche (periods started)
- Any chronic illnesses, e.g. cystic fibrosis, heart or renal disease, long-lasting fever, weight loss.

Examination

Ensure the privacy of the examination setting and have a colleague present if necessary or requested. Depending on the context have a female health worker (or parent or caregiver if the adolescent agrees) present when examining a girl.

DO NOT examine an adolescent's genital area without consent.

- Perform a puberty assessment (see below).
- Perform a general physical examination (p. 12).
- Measure weight and height, calculate BMI and plot BMI z-score on BMI-for-age centile chart (p. 811).

Puberty assessment

The drawings in Table 114, showing the Tanner stages, allow you or the adolescent to determine the stage of pubertal maturation. In girls, the first observable physical sign of puberty is the appearance of the breast bud, a small enlargement of the nipple; in boys, it is enlargement of the testis (Tanner stage 1). Stage 2 corresponds to the start of puberty, while stage 5 signals the end of the process. The process usually last 2–3 years. While it is often difficult to distinguish between stage 3 and 4, or 4 and 5, there is a clear difference between stage 2 and 4 or between 3 and 5.

You can also use the drawings to ask adolescents to self-assess by pointing at the various stages. This avoids the need to undress and undergo direct physical examination, which they often find embarrassing.

Table 114. Tanner stages

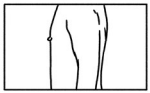
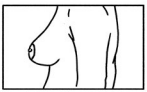
Tanner stage	Girls	Boys
1		
2		
3		
4		
5		

Table 115. Assessment and diagnosis of delayed puberty

Puberty assessment in girls	**Puberty assessment in boys**
Check for: • Presence of breast tissue • Colour and size of the area around the nipples • Presence of pubic hair • Presence of anatomical variants, labial adhesions, vulvar ulcers, vaginal discharge or bleeding (pp. 382–384).	Check for: • Presence of pubic hair • Size of penis (if obese, retract the pubic fat pad to obtain an accurate estimation of size) • Presence of anatomical variants of the penis (e.g. hypospadias), foreskin retractability (p. 372), scrotal pain or swelling (p.366).
Diagnosis of delayed puberty in girls	**Diagnosis of delayed puberty in boys**
• No breast development and/or pubic hair by age 14 years *or* • No menstruation by age 16 years *or* • First signs of puberty appeared > 5 years before menarche.	• No enlargement of penis or testes by age 15 years *or* • No pubic hair by age 15 years.

Investigations

It is possible to assess the progress of puberty by using the five developmental stages based on direct observation (Table 115) without resorting to endocrinological investigations.

Management

Delayed puberty possibly due to chronic illness or undernutrition:

- ▶ Treat underlying medical condition.
- ▶ Address nutritional problems.

Referral

- ▶ Refer to an endocrinologist if no explanation for the delay.

Follow-up

- ▶ Follow up chronic illness or nutritional problems as necessary.
- ▶ Review pubertal development every six months.

8.5 Adolescent with concerns about sexual and reproductive matters

There are a number of issues that need to be discussed with adolescents. In many instances, adolescents may hesitate or be inhibited to ask questions concerning sexual matters.

8.5.1 Sexual and reproductive health assessment

Keep in mind the following:

- Address sensitive issues, such as prescribing oral contraceptives, without involving the parents, if in the best interest of the adolescent.
- Adolescents may be reluctant to disclose information about sensitive matters and feel embarrassed or even ashamed, e.g. about an unwanted pregnancy or sexually transmitted infection. Reduce the stigma around sensitive issues by saying: "I fully understand that you feel embarrassed. I am not here to judge you. I am here to help you."
- Ensure non-discriminatory communication, provide confidentiality and a sex-positive approach to adolescents.
- Be aware of national and local laws regarding the age of access to contraception, age of consent to sexual activity, age of marriage and age of abortion. You may find that, in some situations, prevailing laws may not permit you to act in the best interests of the adolescent (e.g. in some countries prescribing contraceptives to unmarried adolescents is illegal). In such situations, you may need to find the best way to balance your legal obligations with your ethical obligations towards the adolescent.
- Do not impose your own values and beliefs upon adolescents. Your role is to make sure they are safe if they want to engage in sexual activities.
- Respect developmental stages and the cognitive and psychological status of adolescent patients. Tailor your questions to their age and level of development.
- Facilitate access to care, e.g. adolescent-friendly clinic, family planning centre or gynaecologist.

History

Talk to the adolescent alone. Ensure the protection of privacy and confidentiality. Assess competence (p. 666). Obtain consent (p. 666).

- Review the adolescent's lifestyle (see HEEADSSSS assessment p. 670). Encourage the adolescent to share any worries or concerns about sexual matters, e.g. concern about progress of puberty, pain during masturbation or intercourse (p. 679).
- Probe to find out how much the adolescent knows about basic anatomy and function, pregnancy, contraception and STIs, and if there are any concerns.
- Assess:
  - Knowledge and understanding of sexuality:
    - "Have you learned about sexuality at school, at home or elsewhere?"
    - "Any concerns regarding sexual matters?" (see next page)
  - Knowledge and understanding of pregnancy and contraception:
    - "Do you know about and use any contraceptive methods?"
    - "Do you know how to recognize the signs of pregnancy?"
  - Knowledge and understanding of STIs and HIV:
    - "Do you know about sexually transmitted infections and HIV and how to avoid getting infected?"
  - Sexual activity (depending on the context). Be aware that the word "sex" may mean different things to different adolescents.
  - Menstrual history (p. 700)

8.5.2 Sexual education and counselling

- Counsel sexually active adolescents on safer sex and the issue of STIs and provide advice on protection from STIs and pregnancy.
- Provide condoms to all sexually active young people.
- Offer adolescent girls an additional contraceptive method or establish whether they are happy with their existing contraception.
- Fill in knowledge gaps and correct misconceptions where necessary.
- Address any worries or concerns about sexual matters (Tables 116 and 117).
- If there is a high level of risk, consider referral for further sexual education and counselling.

Table 116. Adolescent boy with concerns about sexual matters

Concerns	Assessment and management
Progress of puberty including genital size or growth of pubic hair	▶ Assess stage of puberty (p. 673). ▶ Can usually be resolved by reassuring the adolescent.
Pain during masturbation or sexual intercourse	▶ Perform a physical examination and look for a short frenulum or tight foreskin. This can be corrected by minor urological surgery. Refer if necessary.
Premature ejaculation or difficulty in achieving erection Often linked with inexperience or anxiety in early sexual life	It is helpful for young boys to be able to share their concerns with a health professional. ▶ Advise discussing their feelings and sensations with partner or exploring their own sexuality. ▶ Reassure that it usually disappears over time.

Table 117. Adolescent girl with concerns about sexual matters

Concerns	Assessment and management
Progress of puberty including breast size and development of genitals	▶ Assess stage of puberty (p. 673). ▶ Can usually be resolved by reassuring the adolescent.
Pain during sexual intercourse or on attempting sex • Often linked with inexperience or anxiety in early sexual life • May be linked with vaginismus (involuntary vaginal muscle spasms whenever intercourse is attempted due to fear of vaginal penetration)	It is helpful for young girls to be able to share their concerns with a health professional. ▶ Advise discussing their feelings and sensations with partner or exploring their own sexuality. ▶ Reassure that it usually disappears over time. ▶ If problem does not resolve, refer to gynaecologist to rule out vaginismus.

8.5.3 Contraception

Adolescents should be informed about and have access to a variety of contraceptive choices. Information and prescription of contraception should be made easily accessible, especially to adolescents in vulnerable settings (e.g. from a low socioeconomic setting).

- Adolescents are eligible to use **any** method of contraception unless medically contraindicated (p. 682).
- **Age** alone is not a medical reason for denying adolescents any method of contraception.
- The **cost** of obtaining contraception should not prevent the adolescent from using the most individually appropriate form of contraception.
- The needs of individual adolescents differ greatly: an adolescent in a stable relationship has different contraception needs than an adolescent engaging in various casual sexual relationships.

Counselling on contraception:

- Educate and counsel both before and at the time of method selection to help adolescents make well-informed, voluntary decisions best suited to their needs.
- The advantages of avoiding pregnancy and STIs should be considered in relation to possible concerns regarding the use of specific contraceptive methods in adolescents.
- Address any misconceptions and myths regarding contraception. Clearly state that:
  - Contraception does not affect the ability to get pregnant later in life
  - Contraception does not increase the risk of cancer.
- Side-effects are no more frequent in adolescents than in older women.
- Emphasize the importance of a dual approach combining the use of a condom and a contraceptive medication or method to protect against STIs and prevent pregnancy with boys and girls who report sexual activity.

Contraceptive methods available for use in adolescents

Different contraceptive methods are available and safe. Effectiveness in preventing pregnancy and protecting against STIs and HIV varies between methods (Table 118).

Table 118. Effectiveness of contraceptive methods

Contraceptive method	**Effectiveness in preventing pregnancy** (% of women experiencing unintended pregnancy in 1 year of use)		**Protecting against STIs/HIV**
	Common use (%)	**Perfect use (%)**	
Combined oral contraceptives	7%	0.3 %	No
Progesterone-only pills	7%	0.3%	No
Long-acting, injectable or implant hormonal	3%	0.05–0.3%	No
Progesterone (levonorgestrel)-coated intrauterine device	0.7%	0.5%	No
Copper intrauterine device	0.8%	0.6%	No
Male condoms	13%	2%	Yes
Female condoms	21%	5%	Yes
Diaphragm with spermicide	16%	6%	No
Spermicide	29%	18%	No
Combined patch and vaginal ring	8%	0.3%	No
Fertility awareness-based methods (periodic abstinence)	25% overall	1–9% depending on the method	No
Withdrawal (coitus interruptus)	20%	4%	No

Counsel on how to start taking combined oral contraceptive pills:

Adolescent girl who has menstrual cycles:

- "First-day start". Start the combined oral contraceptive pills on the day menstrual bleeding starts. No additional contraceptive protection is needed; except condoms to protect against STIs (dual conception) *or*
- "Quick start". Start combined oral contraceptive pills at any other time, if the pregnancy test is negative. Use additional contraceptive protection (e.g. condom) for the first seven days of taking the pills. Repeat pregnancy test after fifteen days.

Adolescent girl who is amenorrhoeic (not having periods):

- "Quick start" as above.

Medical eligibility for contraception in adolescents

Some medical conditions need to be considered when providing contraception to adolescents. While some medical conditions are absolute contraindications (Table 119), most are not.

Table 119. Medical contraindications for contraception

Condition	Combined hormonal contraceptive	Progesterone-only contraceptives	Barrier method
History of deep vein thrombosis or pulmonary embolus	Contraindicated	Can be used	Can be used
Hypertension	Not if systolic blood pressure > 140 and diastolic > 90–99 mmHg	Yes, except DMPA[a] if systolic blood pressure > 160 and diastolic > 100 mmHg	Can be used
Known clotting disorders	Contraindicated	Can be used	Can be used
Migraine with aura	Contraindicated	Can be used	Can be used
Active viral hepatitis	Contraindicated	Contraindicated	Can be used
Pregnancy	Contraceptives not needed		Condoms (STI prevention)
Breastfeeding	> 6 months postpartum	> 6 weeks postpartum	< 6 weeks postpartum

[a] Depot medroxyprogesterone acetate

Adolescent girl who has missed taking combined oral contraceptive pill(s)

If an adolescent has missed any of her combined oral contraceptive pills and is sexually active, there is a possibility of her becoming pregnant. This includes vomiting and/or severe diarrhoea while using combined oral contraceptives or progesterone-only pills.

- If any risk of pregnancy, perform a pregnancy test after two weeks.
- Manage according to the number of missed combined contraceptive pills:

Situation	Management
Adolescent missed 1 pill or has started a packet of pills 1 day late	▶ No need for any additional contraceptive protection.
Adolescent missed pills for 2 or more days in a row or started a pack 2 or more days late	▶ Advise to use condoms or abstain from sex until hormonal pills have been taken for seven days in a row.
Adolescent missed many pills, takes contraceptive pills incorrectly and inconsistently	▶ Consider other types of contraception such as long-acting hormonal injectable or implants or intrauterine device.

8.6 Adolescent who reports unprotected sexual intercourse

A substantial proportion of adolescents who engage in penetrative sexual intercourse do so without using effective contraception. Seeking counselling and choosing a contraceptive method require a degree of maturity and experience when talking to a health care provider or pharmacist about health needs.

Talk to the adolescent alone. Ensure the protection of privacy and confidentiality. Assess competence (p. 666). Obtain consent (p. 666).

If the adolescent reports unprotected sexual intercourse

- Be nonjudgmental and inquire about the circumstances and the partner (the need for follow-up and health care differ, e.g. in the case of rape, unanticipated sexual intercourse with an unknown partner or sexual initiation).
- Assess need for provision of emergency contraception if within 3–5 days (p. 684).

- Assess need for post-HIV exposure prophylaxis if within 3–5 days (p. 686).
- Assess the risk for STIs due to this and previous unprotected sexual intercourse if applicable. Assess for and treat STIs including HIV, syphilis and hepatitis (p. 688).
- Arrange a pregnancy test and testing for STIs (p. 688) after two weeks.
- Offer pregnancy testing at two weeks after the unprotected sexual intercourse. If positive, counsel about:
  - Abortion to the fullest extent of the law (p. 696) *or*
  - Continuation of the pregnancy (p. 693).

8.6.1 Emergency contraception

Different emergency contraceptive measures are available depending on the timing of unprotected sexual intercourse (USI). The contraceptive pills and intrauterine device listed in Table 120 can be offered with no restrictions to healthy girls who have attained menarche.

- Emergency contraception is not 100% effective: the longer the delay after unprotected sexual intercourse, the less effective it is.
- Emergency contraception pills should be taken as soon as possible and no more than 5 days (120 hours) after unprotected sexual intercourse.
- Emergency contraception pills are safe and well tolerated.
- The potential harms of an unwanted pregnancy for an adolescent girl outweigh the risks of emergency contraception.
- Relying on emergency contraception as a contraception method is **not** recommended. Counsel on contraception (p. 680).

- Explain to the adolescent girl that:
  - Effectiveness reduces with the lapse of time between sexual intercourse and taking the emergency contraception
  - If she vomits within 3 hours of taking emergency contraception pills, she should take another dose as soon as possible.
- Counsel on resuming or initiating regular contraception after emergency contraception:

Table 120. Emergency contraception

Contraceptive method	Effectiveness	Frequency and dose
Levonorgestrel-only	Up to 72 hours after USI*	1.5 mg as a single dose or two 0.75 mg tablets
Ulipristal acetate	Up to 120 hours after USI	Single-dose 30 mg tablet
Combined oral estrogen-progestogen contraceptives only if above methods are not available and no medical contraindications (p. 682)	Up to 120 hours after USI	Split dose: one dose of 100 µg ethinyl estradiol + 0.50–0.60 mg levonorgestrel and 12 hours later second dose of 100–120 µg ethinyl estradiol + 0.50–0.60 mg levonorgestrel
Copper-bearing intra-uterine device (Cu-IUD) only girls who have attained menarche and at low risk of STIs	Up to 120 hours after USI	—

* USI = unprotected sexual intercourse
Note: follow country-specific regulations setting out which health care provider may prescribe contraceptives and perform intrauterine device (IUD) insertion.

- After taking levonorgestrel or combined emergency contraception pills: resume or start a regular contraceptive method immediately, which may include a copper-bearing intrauterine device
- After taking ulipristal acetate (UPA): resume or start any progestogen-containing method (combined oral contraceptives or progestogen-only contraceptives which may include a copper-bearing or levonorgestrel -releasing intrauterine device on the 6th day after taking ulipristal acetate).

Follow-up

- Follow up in one month to assess if the adolescent girl is pregnant.

8.6.2 Post-HIV exposure prophylaxis

Post-exposure prophylaxis (PEP) helps prevent HIV infection in a person exposed to the risk of HIV infection. PEP services comprise first aid, assessment of risk of exposure to the infection, HIV testing and, depending on the appraised risk, prescription of a 28-day course of antiretroviral drugs, with appropriate support and follow-up. The sooner after exposure antiretroviral medication is initiated, the more effectively it prevents transmission. The estimated per-act transmission risk from unprotected exposure to a person known to be HIV-infected is low, but provision of PEP is still important.

- Consider HIV PEP for children or adolescents if:
  - Source of exposure is known to be HIV-positive
  - Area of high HIV prevalence or source known to be at high risk of HIV infection
  - Exposure has occurred to blood or semen through vaginal, anal or oral intercourse (without a condom or with a condom that broke or slipped) or contact between blood or ejaculate and mucous membrane or non-intact skin wounds.
- Offer HIV testing at the initiation consultation and retest at 3 or 6 months or both. In the event of a positive HIV test, see p. 623.
- HIV post-exposure prophylaxis should be initiated as soon as possible after exposure and *no later than 72 hours*.
- Provide prescription of antiretroviral medicines (ARVs) for the full 28-day course at the first visit to improve uptake and completion of PEP. A regimen with two ARV drugs is effective, but three drugs are preferred. See Table 121 for preferred and alternative regimen. Follow national guidelines, as the choice of PEP drugs may differ due to local resistances.
- For children, the choice of ARV drugs will depend on the availability of approved dosing and age-appropriate formulations for children.
- Discontinue PEP if HIV test of the source of exposure proves to be negative.

Table 121. Preferred and alternative regimen for post-HIV exposure prophylaxis (see dosages in Annex 4)

	Preferred regimen	Alternative regimen
Children ≤ 10 years[a]	AZT + 3TC + DTG[a]	ABC + 3TC + DTG[a] *or* TDF + 3TC + DTG[a] *or* TDF + FTC + DTG[a]
Adolescents > 10 years	TDF + 3TC + DTG *or* TDF + FTC + DTG	

3TC: lamivudine, ABC: abacavir, AZT: zidovudine, DTG: dolutegravir, FTC: emtricitabine, TDF: tenofovir disoproxil fumarate

[a] Dolutegravir (DTG) is the preferred third drug for HIV PEP for children eligible to receive an approved course of DTG. Alternatively, use ATV/r, DRV/r, LPV/r or RAL as a third drug.

Adherence counselling

It is important to counsel on adherence to ensure successful completion of the preventive 28-day regimen as the potential side-effects linked to PEP may have an impact on adherence. Adherence counselling is especially important in adolescents who have experienced sexual abuse, as they may fear being stigmatized or seek to avoid triggering trauma, and often do not present at follow-up visits.

- Counsel and explain the following points:
  - It is important to complete the entire 28-day regimen. If treatment is completed the chance of transmission is very low.
  - Potential medication side-effects such as nausea, vomiting and headaches usually decrease in a few days. Return if side-effects do not go away in a few days.
  - It is important to take each dose at the same time every day.
  - If the patient forgets to take the dose on time, it can still be taken provided less than 12 hours have elapsed.
  - If more than 12 hours have elapsed, wait and take the next dose at the regular time: 2 doses should not be taken at the same time.

Follow-up

- Ensure follow-up at regular intervals and assess adherence to ensure successful completion of the preventive 28-day regimen.
- Encourage HIV testing at 3 or 6 months or both following exposure.
- Counsel on safer sex and condom use.

8.6.3 Sexually transmitted infections

Sexually transmitted infections (STIs) comprise a group of bacterial and viral infections: gonorrhoea, chlamydia, syphilis, trichomoniasis, chancroid, HIV, hepatitis B, herpes simplex virus (HSV) and human papillomavirus (HPV) infection. Chlamydia is the most common bacterial STI especially among adolescent girls aged 15–19 years. Gonorrhoea is the second most common bacterial STI. Coinfection with chlamydia occurs in 10–40% of cases.

Several STIs may be asymptomatic and can have long-term consequences if left untreated, such as infertility and ectopic pregnancy in females. It is therefore important to:

- Examine (Table 122) and test for STIs, if they are suspected.
- Provide counselling messages to sexually active adolescents on the issue of STIs and advice on protection from STIs.
- Provide HPV and hepatitis vaccination, if appropriate.

History and examination

Talk to the adolescent alone. Ensure the protection of privacy and confidentiality. Assess competence (p. 666). Obtain consent (p. 666).

In sexually active adolescents, ask about:

- Number and sex of partner(s)
- Use of condom (by partner(s)): all the time, sometimes, never
- Any contraception.

Carry out a general physical examination.

Ask and check for signs of STI syndromes in boys:

- Swelling in the groin
- Scrotal swelling or tenderness
- Dysuria
- Testicular pain
- Discharge from the tip of the penis or under the foreskin. If you do not see any discharge, and history suggests the presence of an STI, ask the patient to gently squeeze the penis, pressing towards the tip. You may squeeze it yourself if the patient permits.

- Skin lesion on the genitals: vesicles (blisters), (recurring) ulcers (sores), papules, pustules, plaques, nodules, blisters.

Ask and check for signs of STI syndromes in girls:

- Dysuria
- Dyspareunia
- Bleeding after sex and intermenstrual bleeding, vaginal pain
- Abnormal vaginal discharge: colour, consistency, fishy odour
- Vulvovaginal pruritus: itching, burning sensation
- Skin lesions: papules, pustules, plaques, nodules, blisters, ulcers.

Note: most girls with an STI are asymptomatic (50–70%).

! Perform a manual vaginal examination **only if necessary**. Feel for tenderness on movement of the cervix and check the mouth of the cervix for discharge.

Look for any signs indicating sexual abuse (p. 639).

Table 122. Differential diagnosis of sexually transmitted infections

Diagnosis	In favour
No vesicle(s) or ulcer(s) present	
Trichomoniasis *Trichomonas vaginalis*	Vulvovaginal pruritus, burning sensation, fishy smell Usually asymptomatic in boys
Gonorrhoea *Neisseria gonorrhoeae*	In boys: discharge from the tip of the penis or under the foreskin Unspecific in girls
Vesicle(s) or ulcer(s) present	
Genital herpes *Herpes simplex virus* 2	Small painful vesicles (sometimes in clusters) or small ulcers with history of recurrent vesicles
Chancroid *Haemophilus ducreyi*	Painful genital ulcer and tender suppurative inguinal adenopathy
Syphilis *Treponema pallidum*	Painless single firm and non-itchy ulcer or chancre at the infection site → Primary syphilis

Investigations

Several STIs may be asymptomatic at some point (chlamydia, syphilis, HIV), more often among girls. If any STI is suspected, perform an HIV test and screen for other STIs, as coinfections are common:

- Serology for syphilis, HIV and hepatitis
- Testing of swabs of pus, secretions or urine by rapid diagnostic tests, NAAT, microscopy (Gram stain, wet mount) and culture

▶ Perform these tests on site, if available, or take appropriate samples and send to laboratory.

▶ If lab testing is not readily available and symptoms and presentation suggest STI, consider initiating treatment without lab confirmation of infection.

Treatment

▶ Give specific treatment depending on the underlying cause (Table 123). Give clear and comprehensive guidance about the treatment.

▶ Educate on the consequences of not treating or of non-adherence to the recommended treatment.

▶ Encourage the adolescent to openly discuss the issue of STIs and protection with sexual partner(s). All sexual partner(s) within the last two months should be assessed for STI whether symptomatic or not and treated, if necessary.

▶ Counsel regarding contraception and adopting safer sex practices.

▶ Tie in life goals and reasons for practising safer sex including the importance of maintaining personal health and fertility until ready to conceive.

▶ Check the adolescent's adherence to treatment at follow-up.

Table 123. Treatment of sexually transmitted infections

	First choice	Effective substitutes
Chlamydia	• Azithromycin 1 g orally, single dose *or* • Doxycycline 100 mg orally 2x daily for 7 days	• Tetracycline 500 mg orally 4x daily for 7 days *or* • Erythromycin 500 mg orally 4x daily for 7 days *or* • Ofloxacin 200–400 mg orally 2x daily for 7 days
Early syphilis infection of < 2 years' duration	• Benzathine penicillin G 2.4 million units by single IM injection	• Doxycycline 100 mg orally 2x daily for 14 days *or* • Ceftriaxone 1 g IM 1x daily for 10–14 days
Trichomoniasis	• Metronidazole 2 g orally, single dose, or • Tinidazole, 2 g orally, single dose	• Metronidazole 400 or 500 mg orally, 2x daily for 7 days *or* • Tinidazole, 500mg orally 2x daily for 5 days
Chancroid	• Ciprofloxacin 500 mg orally 2x daily for 3 days *or* • Erythromycin 500 mg orally 4x daily for 7 days *or* • Azithromycin 1 g orally, single dose	• Ceftriaxone 250 mg as a single IM injection
Genital herpes Primary infection	• Aciclovir 400 mg orally 3x daily for 10 days *or* • Aciclovir 200 mg orally 5x daily for 10 days	• Valaciclovir 500 mg orally 2x daily for 10 days *or* • Famciclovir 250 mg orally 3x daily for 10 days
Genital herpes Recurrent infection	• Aciclovir 400 mg orally 3x daily for 5 days *or* • Aciclovir 800 mg orally 2x daily for 5 days *or* • Aciclovir 800 mg orally 3x daily for 2 days	• Valaciclovir 500 mg orally 2x daily for 3 days *or* • Famciclovir 250 mg orally 2x daily for 5 days.

Treatment for gonorrhoea

Local resistance data should determine the choice of antibiotics. Initiate single therapy based on recent local resistance data confirming susceptibility to the antimicrobial. If local resistance data are not available, use dual rather than single therapy (Table 124).

Table 124. Single and dual therapy for gonorrhoea

Single therapy	Dual therapy
• Ceftriaxone 250 mg IM, single dose *or* • Cefixime 400 mg orally, single dose *or* • Spectinomycin 2 g IM, single dose.	• Ceftriaxone 250 mg IM, single dose + azithromycin 1 g orally, single dose *or* • Cefixime 400 mg orally, single dose + azithromycin 1 g orally, single dose.

Prevention of STIs

- Counsel on prevention of STIs and condom use.
- Consider offering oral HIV PEP containing tenofovir disoproxil fumarate (TDF) as additional prevention for people at substantial risk of HIV infection: some groups of men who have sex with men, transgender women in many settings, heterosexual men and women who have sexual partners with undiagnosed or untreated HIV infection.
- Offer hepatitis A and B virus and HPV vaccination (p. 68).

Follow-up

- Tell the patient to return in one week if symptoms persist.
- Reassess after one week or sooner if the condition gets worse.
  - If there is no improvement and the full course of medication is not completed: treat again.
  - If no improvement and possible reinfection or partner(s) not treated: treat patient and partner(s) again.

Referral

Refer if there is no improvement.

8.6.4 Pregnancy

History

- Talk to the adolescent alone. Ensure the protection of privacy and confidentiality. Obtain consent (p. 666).
- Always ask any adolescent who has experienced menarche about sexual activity and contraception.

Ask the adolescent about the following:

- Sexually active, time of last sexual intercourse
- Trying to get pregnant or avoiding getting pregnant
- Using any contraceptive method and if so, which one (e.g. condom, non-penetrative intercourse)
- Forgotten to take any contraceptive pills since last normal period: sex without a condom at any time or condom came off or burst during sex
- Any recent intake of medication (e.g. antibiotics)
- Any symptoms of pregnancy or complications:
  - Delayed or missed period
  - Nausea or vomiting in the morning
  - Swollen or sore breasts
  - Bleeding from the vagina
  - Lower abdominal pain
  - Pain (mild/moderate/severe).

Examination

- Ensure a private and comfortable examination setting.
- Have a female colleague present if necessary or requested.
- If there is pain in the lower abdomen and a positive pregnancy test, refer **immediately** to hospital to **rule out an ectopic pregnancy**.

- Perform a general physical examination.
- Look for signs and symptoms of STIs (p. 688).
- Beware of any signs indicating sexual abuse (p. 639).

Investigations

A urine test for pregnancy can be negative for up to two weeks after a missed period, even in the event of pregnancy. If there is a high suspicion of pregnancy, repeat the test more than two weeks after the missed period.

Assessment of a possible pregnancy

Fig. 7 illustrates how to assess if a sexually active adolescent girl is pregnant.

- Tell the adolescent how important it is to perform a pregnancy test each time there is the slightest suspicion of a pregnancy.

- If the test is negative:
  - Consider repeating it after two weeks
  - Discuss and provide contraception (p. 680) as well as STI and HIV counselling (and on-site testing if required) (p. 623).
- If the test is positive, provide information on how to proceed (see below and, if appropriate, chapter on abortion, p. 696).

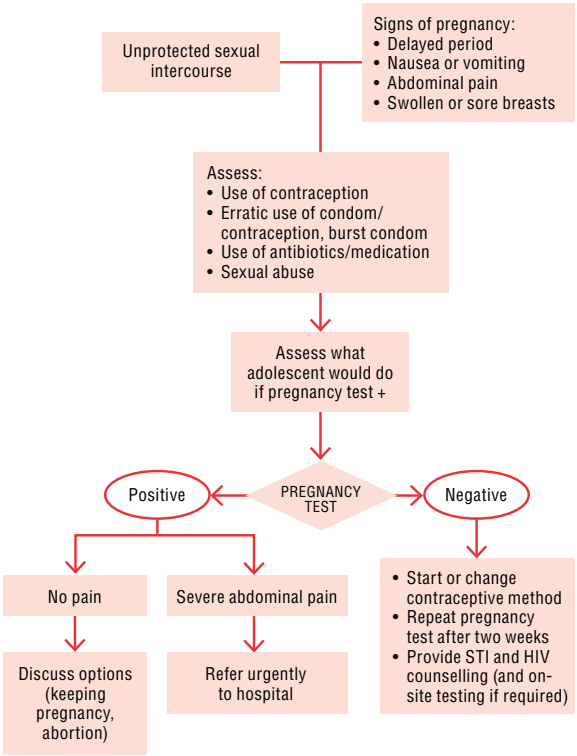
Management

The outcome and prognosis of an adolescent pregnancy, if carefully monitored, are as good as for adult women, at least for those who have reached Tanner stage five. Most of the complications of adolescent pregnancies are linked to poor access to adequate prenatal care and skilled care at birth.

In the event of a *confirmed* pregnancy

The decision whether to keep the pregnancy or not is often of utmost sensitivity and must be dealt with in an atmosphere of trust and empathy. Understanding how the adolescent perceives her pregnancy is essential in order to offer her the best possible support and treatment. Her perception of the existing pregnancy may depend on many factors.

Fig. 7. Assessment of a possible pregnancy



- Assess her socioeconomic situation, determine whether she is in a stable relationship and if the pregnancy is expected or wanted.
- Assess personal, family and cultural/religious factors.
- Discuss the meaning of pregnancy and expectations.
- Provide antenatal care or refer to a specialized centre, or refer to abortion services (see next section).

In the event of a *possible* pregnancy

- Advise the adolescent that although there are no signs of pregnancy it is too early to say definitively whether she is pregnant or not.
- Counsel regarding options.
- If she does not want to become pregnant, discuss contraception methods she may use until it is clear what her status is.
- Follow up two weeks later to check whether she is pregnant.

8.6.5 Abortion

Abortion care should be legal, safe and free.

In most countries in Europe abortion can be legally performed, despite a wide variation in the restrictions under which it is permitted. Adolescents are less likely than adults to be able to obtain legal and safe abortions. Some of the barriers faced by adolescents include requirements for third-party authorizations (including parental consent) and inability to pay the required fees. In some countries, minor adolescents may have access to abortion without their parents' knowledge, depending on the adolescent's age and decision-making capacity.

How to handle the issue of abortion with an adolescent:

- Treat all adolescents equitably regardless of age, ethnicity, socioeconomic status.
- Be aware of the legal framework in your country regarding abortion.
- Respect the adolescent as the decision-maker.
- Provide complete, accurate and easy-to-understand information.
- Respect the adolescent's dignity, guarantee privacy and confidentiality; be sensitive to her needs and perspectives.

- Protect medical information against unauthorized disclosures.
- Be aware of situations in which an adolescent may be coerced into having an abortion against her will.
- Encourage parents' engagement through support, information and education (except in the case of suspected sexual abuse by parent or relative, see p. 639).
- Act in the best interest of the adolescent, e.g. assess dangers if family or sexual partner is informed, e.g. risk of self-harm, suicide or sexual abuse.
- Adolescents may choose to get an abortion (depending on age and assessed competence) without parental authorization unless it is a legal requirement. Do not insist on the parents' authorization.

Management of a safe abortion

When performed by skilled providers using correct medical techniques and drugs, and under hygienic conditions, induced abortion is a very safe medical procedure. The type of abortion (see medical and surgical abortion in Tables 125 and 126) depends on the legal framework in your country and the gestational age of the pregnancy.

Assessment prior to abortion

- Inquire whether this is the first pregnancy and if the pregnancy was expected or not.
- Look for signs indicating sexual abuse (p. 639).
- Assess uterine size (bimanual pelvic and abdominal examination).
- Confirm pregnancy with a urine test (p. 695).
- Assess last menstrual period and stage of pregnancy.
- Ultrasound scanning is not routinely required.

The decision to perform an abortion or not is heavily influenced by moral and religious values. Unintended or unexpected pregnancy poses serious psychological and ethical issues that need to be discussed:

- Discuss the decision in detail, possibly on several occasions with and without the parents or caregivers in an empathetic climate.
- Involve the male partner and parents or caregivers in the discussion, whenever possible and if agreed to by the patient.

Table 125. Medical abortion

	Up to 9 weeks (63 days)	9–12 weeks (63–83 days)	> 12 weeks (84 days)
Mifepristone and misoprostol	Mifepristone 200 mg single dose orally		
	24–48 hrs after mifepristone: misoprostol 800 µg, vaginal, buccal *or* sublingual, single dose *or* if no more than 7 weeks (49 days): misoprostol 400 µg single dose orally	36–48 hrs after mifepristone: misoprostol 800 µg vaginal, followed by 400 µg vaginal *or* sublingual every 3 hours, up to 5 doses	36–48 hrs after mifepristone: misoprostol 400 µg oral *or* 800 µg vaginal, followed by 400 µg vaginal *or* sublingual, every 3 hours, up to 5 doses administered in the health-care facility
Misoprostol alone*	Misoprostol 800 µg, vaginal or sublingual, up to 3 doses taken at an interval of minimum 3 and maximum 12 hours		Misoprostol 400 µg, vaginal or sublingual, every 3 hours, up to 5 doses

* Since the effectiveness of misoprostol alone is lower and the abortion process more painful and drawn out, misoprostol combined with mifepristone should be offered whenever possible.

Supportive care

- Prescribe pain medication and iron tablets for anemia, if indicated.
- Provide emotional support. Referral to psychological or social services, if needed.
- Counsel on contraception to prevent further abortions (p. 696). Advise starting a combined oral contraceptive immediately after the abortion.
- Counsel and test for STIs (p. 683) including HIV (p. 623).

Follow-up

- Follow up after 7–21 days to confirm success of the medical abortion. Assess signs and symptoms of a successful medical abortion (heavy bleeding with clots, passage of the products of conception and strong abdominal pain). Perform or refer for ultrasound, if needed.

- If ongoing symptoms of pregnancy are reported or in the event of only minimal or no bleeding after taking the medication, suspect ongoing pregnancy. Perform a pelvic examination to palpate for a growing uterus or perform or refer for an ultrasound.
- Refer for provision of surgical abortion (Table 126), if indicated.

Table 126. Surgical abortion

< 12–14 weeks of pregnancy	> 12–14 weeks of pregnancy
Vacuum aspiration (manual vacuum aspiration *or* electric vacuum aspiration)	Dilation and evacuation

Unsafe abortion

Unsafe abortion is responsible for major health problems and deaths around the world. Adolescents may choose to abort illegally or outside the main health care system for various reasons, e.g. lack of or false information, no access to the health care system, fear of disclosing the situation to their parents, caregivers and doctors, and lack of financial resources.

! Health-care providers are obliged to provide life-saving medical care to any adolescent who suffers abortion-related complications, including treatment for complications from unsafe abortion, regardless of the legal grounds for abortion.

You should be able to recognize abortion complications and to provide or refer adolescents for prompt care, 24 hours a day, regardless of the legal grounds for abortion.

There are various health and life-threatening consequences of unsafe abortion due to:

- Infection of the internal and external genital organs
- Incomplete abortion (failure to remove or expel all of the products of conception from the uterus)
- Uterine perforation (caused by piercing uterus with a sharp object)
- Damage to the genital tract and internal organs by inserting dangerous objects, e.g. sticks, knitting needles, or broken glass into the vagina or anus.

RED FLAGS

Be alert when facing any of the following signs and symptoms in an adolescent following a known or suspected abortion:

- Severe vaginal bleeding which does not resolve spontaneously
- Abdominal pain
- Signs of an acute infection or sepsis; fever, foul-smelling discharge
- Signs of shock.

Treatment and referral

- Assess and treat danger signs (see Emergency chapter).
- Refer immediately for emergency treatment:
  - Infection must be treated with antibiotics along with evacuation of any remaining pregnancy tissue from the uterus.
  - Bleeding may need blood replacement and emergency medication to control shock.
  - Surgery may need to be performed in the event of incomplete abortion, uterine perforation or damage to the genital tract and internal organs.

8.7 Adolescent girl with menstrual cycle problems

Menarche usually occurs during the second part of the pubertal spurt (e.g. Tanner stage 4). It is not unusual for a girl to have irregular menses, especially during the first 1–2 years after menarche.

A normal menstrual cycle is characterized by:

- Duration of menstrual cycle: between 21 and 35 days
- Menstruation lasting 2 to 7 days.

History

Assess:

- Sexual activity
- Contraceptive method, if any (an intrauterine device can cause dysmenorrhoea).
- Menstrual history:
  - Menarche attained and age of attaining menarche

  - In the case of amenorrhoea, ask about duration
  - Any pain during periods that is affecting daily life? Pain during period or in the middle of the cycle?
  - Excessive bleeding during the periods, duration of period, how many pads (or equivalent) are used in a day?
  - Regularity of the periods: at the same time every month, how many days between periods?
- Risk factors for disruptions in the menstrual cycle:
  - Excessive sports activities
  - Stress: recent stressful events
  - Chronic conditions
  - History of genetic disease
  - Possible pregnancy (see signs of pregnancy, p. 693)
  - Eating problems: assess eating habits, weight loss or gain (p. 511).

Examination

- Look for signs of polycystic ovary syndrome (PCOS): hirsutism, obesity, acne.
- Assess pubertal stage (p. 673).
- Measure height, weight and calculate BMI (p.20).

8.7.1 Hypermenorrhoea

Total blood loss during menstruation that exceeds normal limits (> 80 mL/cycle or change of menstrual products more often than every 1–2 hours).

Investigations

- Full blood count to assess for anaemia (p. 406).

Referral

Refer to a gynaecologist if lasting for more than 3 cycles.

8.7.2 Dysmenorrhoea

Dysmenorrhoea is common, and if severe can have devastating consequences (missing school, skipping events with peers, depression).

Investigation

- Pregnancy test to rule out a possible pregnancy.
- If fever is accompanying the pain, rule out pelvic inflammatory disease.

Treatment

- Physiological dysmenorrhoea can be managed with warm pads placed on the abdomen *or*
- Nonsteroidal anti-inflammatory drugs: ibuprofen:
  - if weight > 40 kg: 400 mg orally 3–4 times daily
  - If weight < 40 kg: 200 mg orally 3–4 times daily.
- Counsel to:
  - Start medication as soon as the pain begins
  - Continue medication until the pain stops
  - Take medication with food
  - Avoid taking medication for more than seven consecutive days
  - Continue with normal daily activities as much as possible.
- If no improvement after three months, consider prescribing a combined oral contraceptive (p. 681), especially in older adolescents.
- Refer to specialist to rule out endometriosis in dysmenorrhoea that starts before menstruation and lasts for the duration of the menstrual period.

8.7.3 Amenorrhoea

Amenorrhoea (absence of menses) can be transient, intermittent or permanent. Primary amenorrhoea is the absence of menarche (first menses) by age 16. Secondary amenorrhea is the cessation of regular menses for three months or the cessation of irregular menses for six months.

Common causes of amenorrhoea include:

- Pregnancy (p. 693) – most common cause of secondary amenorrhoea
- Polycystic ovary syndrome (PCOS)
- Excessive sports activities
- Fatigue
- Stress
- Eating problems (p. 552)

- Chronic conditions
- Genetic diseases (in primary amenorrhoea).

Investigations

- Pregnancy test if menstruation is delayed for more than 10–15 days and the adolescent is sexually active.

Management

- Refer adolescents with primary amenorrhoea after age 16 to an endocrinologist or gynaecologist for further investigations.
- Consider referral of adolescents with secondary amenorrhoea, if underlying cause is not clear, for further investigations (including assessment of hormone levels: prolactin, gonadotropin, estradiol, androgens).

8.8 Adolescent with skin problems

Acne vulgaris is the most common skin disease in adolescents. See p. 382 for information on other skin conditions.

History

Assess:

- Duration of the complaint.
- Type of previous treatment and duration, if any.
- In females: type of oral contraceptive pills or injections, if any.

Examination

Inspect face, neck, chest, back and upper arms and look for:

- Comedones: whiteheads or blackheads with no redness (blocked hair roots or pores with white or black tips)
- Pustules: pus-filled pimples with no redness
- Papules: pimples that appear red due to inflammation
- Nodules: pimples that affect the deeper areas of the skin and can be particularly disfiguring due to inflammation (redness)
- Cysts: lesions formed by several nodules coming together
- Scarring: check age of scarring and for signs of inflammation.

Differential diagnosis

See other skin conditions (p. 382).

Treatment

- Counsel on general skin care: wash face with mild soap twice daily (before topical applications).

Mild acne:

- Prescribe topical benzoyl peroxide 2.5% or topical retinoid such as adapalene 0.1%.
- If both are poorly tolerated, consider azelaic acid. Counsel to apply 1–2 times daily.

Moderate acne:

- Prescribe topical benzoyl peroxide and retinoid (adapalene) **or** topical retinoid and topical antibiotic, e.g. clindamycin gel or lotion 1% + tretinoin 0.025% **or** topical antibiotic (e.g. clindamycin gel or lotion 1%) and topical benzoyl peroxide (start with 2.5% and increase strength and frequency gradually as necessary).
- Counsel to apply to the lesions twice a day. Continue until two weeks after the lesions disappear.

Severe acne:

- Prescribe oral antibiotics for 3–6 months: tetracycline 500 mg twice daily or erythromycin 500 mg twice daily or doxycycline 50 mg once daily *and* topical benzoyl peroxide 2.5%–5% or topical retinoid. Apply to the lesions twice a day until two weeks after the lesions disappear.
- For girls: if taking progesterone-only contraceptive pill or injection consider changing to combined oral contraceptive pill (which may improve acne in some women).

Follow-up

- Review adolescents with moderate or severe acne in two months.
- Moderate acne: if there is no improvement or acne is worse: commence (or continue) treatment with oral antibiotics for up to six months with review every two months. In severe acne, the dose of doxycycline can be increased up to 100–200 mg daily depending on the response.

- For girls: if there is no improvement in three months continue oral antibiotics and add combined oral contraceptive pill in consultation with the adolescent (p. 680).

Referral

- Refer to dermatologist if:
  - The acne is very severe
  - Scarring is extensive or worsening
  - The acne is causing great psychological distress
  - The acne is not responding to treatment at six months.

8.9 Adolescent with emotional and behavioural problems

Half of all people who develop emotional problems display initial symptoms during adolescence and 75% present their first symptom by their mid-20s. If these early symptoms are left unaddressed, they can impact child or adolescent development, educational attainments and the potential to live a fulfilling, productive and healthy life.

Early identification and early treatment can change the course of a person's entire life. Assess mood and behaviour on several occasions and be alert if symptoms persist.

Assessment of mental health

- Adolescents should always be offered the opportunity to be seen on their own, without parents or caregivers present.
- Clarify the confidential nature of the discussion: indicate under what circumstances parents or other adults will be given information.

- Assess for symptoms of emotional or behavioural problems:
- Chronic physical or functional symptoms (e.g. headaches, backaches, fatigue)
- Difficulty in keeping up with peers or in carrying out daily activities considered normal for age
- Violent behaviour against others or self-harming behaviour
- Easily distracted, disruptive in class, often getting into fights or conflicts, difficulty completing homework

- Risk factors for mental health problems: parents with psychiatric conditions, trauma, violence, maltreatment or neglect (p. 637), chronic diseases, substance abuse (p. 649).

RED FLAGS

- Problems lasting more than a few weeks.
- Persistence and severity of continuous symptoms.
- Symptoms negatively impact on the young person's development.
- Day-to-day activities are compromised.

* Remember that normal adolescent progress is marked by fluctuations in mood and behaviour.

- Explore the presenting complaint with the adolescent (and caregiver, as appropriate). Remember to address:
  - The adolescent's behaviour
  - His/her self-image
  - His/her dreams, mood and life perspective.
- Assess and monitor the seriousness of a condition over time, as well as its impact on cognitive, affective, social and educational development.

Management

More information on the diagnosis and management of common behavioural and emotional problems during adolescence can be found in other sections:

- Depression (p. 526)
- Anxiety (p. 534)
- Suicidal thoughts and self-harm (p. 530)
- Substance use and abuse (p. 649)
- Eating problems (binge-eating, bulimia nervosa, anorexia nervosa) (p. 552)
- Excessive use of the internet and social media (p. 653)
- Sleeping problems (p. 546)

8.10 Adolescent living with chronic conditions

This section outlines special considerations pertaining to adolescents living with chronic conditions. Any condition, but especially when chronic, can have a major impact on adolescence.

Chronic conditions may affect the following aspects of adolescent life:

- Growth and puberty: developmental delay may be associated with some chronic conditions, and slowed by some medications (e.g. steroids). Growth and development may themselves reciprocally influence the chronic condition, since changes in metabolism and hormone levels in adolescence can modify the disease or the response to medications (e.g. insulin resistance in type 1 diabetes mediated by hormones in puberty).
- Mood, psychological well-being
- Social life and interaction with peers
- Capacity to attend school
- Family life due to frequent hospital admissions, financial burdens and anxieties regarding the child's future
- Acquisition of autonomy.

Management

Along with the intervention of a specialist or specialized (often multidisciplinary) team, the role of the primary care provider is crucial. During consultations for an adolescent with a chronic condition, address the following at least every 6 months:

- Adapt the way you deliver information and interventions to the adolescent's stage of development.
- Reserve some time for a confidential discussion without the parents or caregivers.
- Assess:
  - How the condition has developed over time.
  - If there is a need for further information about the condition and treatment.
  - If there are any problems with medication (e.g. side-effects).
  - The effect of the condition on growth (p. 20) and pubertal development (p. 673).
  - Adherence to therapy in a non-judgemental manner including how far the adolescent seeks to be actively responsible for the situation and

condition. In a quest for greater autonomy, the adolescent may be tempted to influence some aspects of treatment and jeopardize the outcome of the disease.

— The potential impact of the condition on everyday life, self-esteem and self-image, school and education (e.g. missing school, special events during school hours), family and social life, mood, depression, anxiety and risk-taking behaviour (see HEEADSSSS assessment, p. 670).

- Look for and manage other health needs in addition to the chronic condition such as acne, pain, substance use or sexual and reproductive health, worries about growth.
- Inquire about other aspects of therapy: diet, exercise, physiotherapy.
- Discuss with the family the adolescent's progressive needs for privacy and confidentiality.

Table 127 proposes a *developmental approach* to support the adolescent and the family in coping with a chronic condition.

Table 127. Developmental approach for adolescents with a chronic condition

Adolescence stage	Role of the family	Education, school and social life
Early adolescence	• Discuss how to encourage the adolescent to take an active part in the treatment of the condition	• Connect, if appropriate, with school staff and discuss adaptation of school environment to the condition (access to classroom, presence of school nurse).
Middle adolescence	• Explore how to give the adolescent some autonomy in managing the condition progressively	• Review how to foster interactions with peers (e.g. team/club). • Foresee expectations regarding school and professional life.
Late adolescence	• Support the parents or caregivers in giving autonomy to the adolescent	• Support school or professional life to adapt the setting to the condition. • Discuss school and professional future prospects. • Discuss personal future expectations regarding living with a partner, reproductive life, genetic issues.

Organize transition to adult services

Anticipate the issue of transition from the field of paediatrics towards adult health care settings. Timing of transition should be determined by age, but also by mental and physical development. Several approaches are possible: group discussions, early identification of specialists working in adult health, organizing a joint meeting with medical practitioners or clinical nurses who work in both settings.

- Ask the adolescent and the parents to reflect in advance on how to organize a smooth transition.
- Organize a clear and documented handover with full participation of the adolescent concerned.

Notes

CHAPTER 9

Emergencies and trauma

9.1 Principles of emergency care

- Use the ABCDE approach.
- Identify children at risk of deterioration early.
- Be prepared and communicate effectively with your team.

Safety

- Keep providers and others safe: scene hazards, violence, infectious diseases.

Communication

- Call for appropriate help early (other team members, ambulance).
- Communicate effectively with your team, patient, caregivers, next provider.

Training

- Simulate emergencies and train your team regularly.

Equipment and medication

See Annex 1 for a list of equipment and drugs which should be available in the primary health care setting for emergency situations. This includes intraosseous needles.

Stepwise approach to the severely ill child (Chart 2)

First observational assessment

The **quick look** is a hands-off assessment (< 30 seconds) to decide whether the child needs immediate life support interventions. Does the child look unwell/irritable/drowsy/floppy? Does the child respond? Does the child have a weak cry?

ABCDE approach

A stepwise assessment to look for signs of serious illness or injury, easily remembered as ABCDE: **A**irway, **B**reathing, **C**irculation, **D**isability (mental status) and full **E**xposure of the body to look for hidden injuries, rashes, bites or other lesions. A problem identified at any step must be addressed immediately before moving on to the next step. The ABCDE approach (p. 716) should be performed in 5 minutes.

SAMPLE history

Immediately after the ABCDE approach, gather history critical to the management of the ill child following the SAMPLE frame (p. 717).

Normal ranges of vital signs

Table 128. Normal range of vital signs (5th–95th percentiles)

Age	Approx. weight (kg)[a]	Respiratory rate (breaths/min)	Heart rate (beats/min)	Systolic blood pressure (mmHg)[b]
1 month	3–5	25–60	110–180	50–100
1 year	10	20–50	100–170	70–105
2 years	12	18–40	90–160	70–105
5 years	18	17–30	70–140	75–110
10 years	30	14–25	60–120	80–120
> 15 years	50	12–18	60–100	100–130

[a] Estimated weight for ≥ 1 year: (age + 4) x 2
[b] Minimum systolic blood pressure (mmHg): 70 + (age x 2)

- Trends are more informative than single readings
- Normal heart rates are 10% slower in sleeping children.

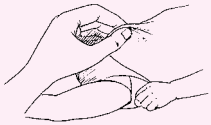
9.2 Assessment of emergency signs

Assess the Airway and Breathing

- **Obstructed breathing**. Look at the chest wall movement, and listen to breath sounds to detect poor air movement during breathing. Stridor indicates upper and wheeze indicates lower obstruction.
- **Central cyanosis**. Bluish or purplish discoloration of the tongue and inner mouth.
- **Severe respiratory distress**. The breathing is very laboured, fast or gasping, with chest indrawing, nasal flaring, grunting or the use of auxiliary muscles for breathing (head nodding). Child is unable to feed because of respiratory distress and tires easily.

Assess Circulation (for shock)

- **Cold hands**
- **Capillary refill time > 2 s**. Apply pressure to the nail bed for 5 s. Check how long it takes for the pink colour to return after the moment of release.
- **Weak and fast pulse**. Feel for the radial or carotid pulse (older child) or brachial or femoral pulse (infant). It is difficult to feel the pulse in children. Consider context and other signs and symptoms.
- **Systolic blood pressure low for the child's age** (Table 128). Shock may be present at normal blood pressure, but very low blood pressure signifies that the child is in shock.
- **Assess for signs of severe dehydration (in diarrhoea)** Sunken eyes? Skin pinch goes back very slowly (> 2 s)? Pinch the skin of the abdomen for 1 s, then release and observe.



Assess Disability (for coma and convulsions)

- Check the **level of consciousness** on the AVPU scale (**a**lert, responds to **v**oice, responds to **p**ain, **u**nresponsive). If the child is not awake and alert, try to rouse the child by talking or shaking the arm. If the child is not alert but responds to voice, he or she is lethargic. If there is no response, ask the parents whether the child has been abnormally sleepy or difficult to wake. Determine whether the child responds to pain or is unresponsive to a painful stimulus. If this is the case, the child is in coma (unconscious) and needs emergency treatment.
- **Convulsions**. These may be very subtle, especially in infants.

9.3 Respiratory and cardiac arrest

See Paediatric life support algorithm p. 718.

Airway and Breathing

- Slow and shallow breathing or loss of breath sounds
- Central cyanosis

Circulation

- Slow pulse rate or no pulse rate

Search for and treat reversible causes of cardiac arrest (the four Hs and four Ts)

- **H**ypoxia → Give oxygen (p. 723).
- **H**ypovolaemia → Give fluids (p. 725).
- **H**ypothermia → Keep the child warm.
- **H**ypoglycaemia → Give glucose (p. 728).
- **T**ension pneumothorax → (p. 797).
- **T**oxins → See poisoning p. 748, and envenoming p. 753.

It may be difficult to detect and treat the following reversible causes in a primary health care setting. Be aware of the possibility and refer urgently for specific treatment.

- **T**amponade (fluid in the pericardium compressing the heart).
- **T**hrombosis.
- **H**yper-/hypokalaemia.

Chart 2. ABCDE approach

Quick look

Responsive? **If unresponsive** → Follow *paediatric life support* algorithm (p. 718)

- Stay calm. Call for **help**. Keep the child **calm/comfortable/warm**.
- **Treat life-threatening problems** before continuing the assessment.

ASSESS	TREAT
Airway and Breathing	
↘ *If a cervical spine injury is possible,* ***do not*** *move neck*, immobilize the neck and use jaw thrust to open the airway.	
■ Obstructed breathing ■ Central cyanosis or SpO_2 < 94% ■ Respiratory distress: • fast breathing • chest indrawing • obstructed/noisy (stridor, wheeze) or gasping.	***IF POSITIVE***
	If foreign body aspirated: ▶ Manage airway in choking child (p. 719). If no foreign body aspirated: ▶ Manage the airway (p. 720). ▶ Give oxygen (p. 723). ▶ Continue management of **Severe respiratory distress** (p. 729).
Circulation	
■ Shock: • cold extremities + • weak and fast pulse + • capillary refill time > 2 s ■ Severe dehydration: • lethargy • sunken eyes • slow return after pinching skin.	***IF POSITIVE***
	▶ Stop any bleeding (p. 744). ▶ Give oxygen (p. 723). ▶ Give IV fluids if not contraindicated (p. 725). ▶ Continue management of **Shock** (p. 733).

ASSESS

TREAT

Disability

↘ Determine the level of consciousness with the AVPU method: **a**lert, responds to **v**oice, responds to **p**ain, **u**nresponsive?

- Lethargy (not alert, but responsive to voice or pain)
- Coma (unresponsive to pain)
- Convulsions
- Low blood glucose (< 3 mmol/L or < 54 mg/dL).

IF POSITIVE

- ▶ If unconscious, A and B stable and no neck trauma: place in recovery position (p. 726).
- ▶ If convulsing, give rectal diazepam (p. 727).
- ▶ If low blood glucose, give glucose (p. 728).
- ▶ Continue management of **Lethargy or coma** (p. 737).

Exposure

↘ Expose and examine the child fully:

- Injuries, bites or burns
- Rash (non-blanching)
- Abdominal distension
- Temperature.

IF POSITIVE

- ▶ Remove tight clothing.
- ▶ Manage body temperature.
- ▶ Treat pain (p. 508).
- ▶ Manage
  - Trauma (p. 741).
  - Burns (p. 745).
  - Poisoning (p. 748).
  - Envenoming (p. 753).
  - Drowning (p. 756).
  - Electrocution (p. 757).
  - Acute abdomen (p. 758).

SAMPLE approach

↘ Take history rapidly:

- **S**igns and symptoms (fever, abdominal pain)
- **A**llergies
- **M**edications
- **P**ast medical history
- **L**ast oral intake
- **E**vents surrounding illness (poisoning, envenoming).

Further management

- ▶ Reassess regularly for signs of improvement or deterioration.
- ▶ Monitor **vital signs**: respiration rate, heart rate, blood pressure, oxygen saturation (SpO_2), temperature.
- ▶ Only when ABCD are stable, undertake a head-to-toe examination.
- ▶ Organize rapid transfer to hospital. Maintain required level of monitoring and management until the emergency team arrives. If you are the most experienced health care provider you may have to accompany the child to the hospital.

Chart 3. Paediatric life support algorithm

Safety of rescuer and child – **Stimulate** the child – **Shout** for help

Airway

Open airway (p. 720)

If cervical spine injury possible, immobilize the neck and use jaw thrust

Remove any obvious airway obstruction

Consider oropharyngeal airway (p. 721).

Breathing

Breathing normally?

Look, listen, feel for breathing

YES → **Continue with ABCDE approach** (p. 716)

NO – or only occasional gasps

5 initial rescue breaths (p. 722)

Use bag-valve mask (100% O_2 10 L/min)

Each breath for 1 s, make the chest rise.

Circulation

Signs of life?

Cough? Any movements? Pulse?

YES → **Continue rescue breathing** (ventilation) (p. 722)

NO

Reassess every 2 minutes

15 chest compressions (p. 724)

Lower half of the sternum 100–120/min

1/3 of anteroposterior chest dimension

2 rescue breaths

Continue 15 compressions : 2 breaths

IV/IO access: epinephrine (adrenaline) 0.01 mg/kg every 3–5 min

Organize emergency transport to hospital*

! Treat **reversible** causes of respiratory and cardiac arrest (p. 715)
Re-assess regularly – Keep child **warm**

* Maintain required level of life support until the emergency team arrives. If you are the most experienced health care provider you must accompany the child to the hospital.

Note: this algorithm is applicable to children of all ages except for newborns at birth.

Chart 4. Managing choking in a child

Infant < 1 year of age

Back blows/slaps

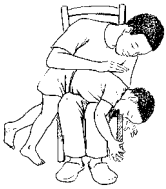
- Lay the infant on your arm or thigh in a head-down position.
- Give 5 blows to the middle of the infant's back with the heel of the hand.

Chest thrusts

- If obstruction persists, turn the infant over and give 5 chest thrusts with two fingers on the lower half of the sternum.
- If obstruction persists, check infant's mouth for any obstruction that can be removed.
- If necessary, repeat sequence with back slaps.

Child > 1 year of age

- Give 5 back blows to the middle of the child's back with the heel of the hand, with the child sitting, kneeling or lying.
- If the obstruction persists, perform a Heimlich manoeuvre: go behind the child and pass your arms around the child's body; form a fist with one hand immediately below the child's sternum; place the other hand over the fist and pull upwards into the abdomen (see illustration); repeat this five times.
- If the obstruction persists, check the child's mouth for any obstruction that can be removed.
- If necessary, repeat sequence with back blows.



Back blows

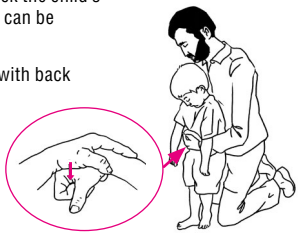


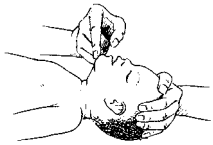
Chart 5. Opening the Airway

- **Open the Airway**

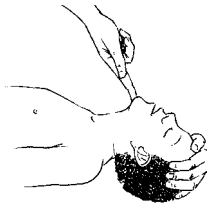
  a. **No suspected neck trauma:** in infants, keep the head in a neutral position with nose pointing up. In older children, keep the head tilted and lift chin to open airway.

  b. **Suspected neck trauma:** stabilize the neck and use jaw thrust to open the airway. Gently place the fourth and fifth fingers behind the angle of the jaw and lift the bottom of the jaw forward to open the airway at 90° to the body.

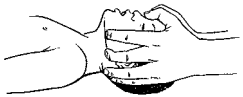
- Inspect mouth and remove foreign body if present and easily visible.
- Clear secretions from the throat.
- Check the airway: look for chest movements, listen for breath sounds and feel for breathing.
- If still not breathing, ventilate with a bag and mask (p. 722).



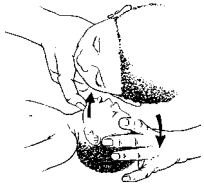
INFANT – Nose up
Neutral position to open the airway in an infant



OLDER CHILD – Chin up
Tilting position to open the airway in an older child



Jaw thrust without head tilt



Look, listen and feel for breathing

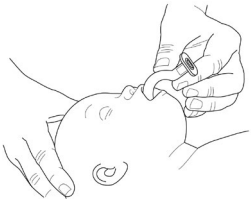
Chart 6. Insertion of an oropharyngeal (Guedel) airway

The oropharyngeal or Guedel airway can be used in an unconscious patient to improve airway opening. It may not be tolerated in a patient who is conscious and can induce choking or vomiting.

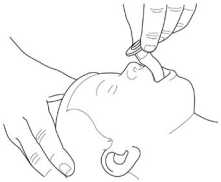
- Select an appropriate-sized airway that goes from the centre of the teeth (incisors) to the angle of the jaw when laid on the face with the raised curved (convex) side up ("the right side up").
- Open the airway (p. 720), do not move the neck if trauma suspected.
- **Infant:** insert the airway convex side up.

  Child: insert the airway "upside down" (concave side up), until the tip reaches the soft palate. Rotate through 180° and slide back over the tongue.
- Re-check airway opening. Use a different sized airway or reposition if necessary.
- Give oxygen.

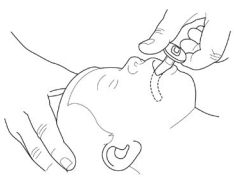
Selecting the right size of an oropharyngeal airway



Inserting the oropharyngeal airway in an <u>infant</u>: convex side up



Concave side up



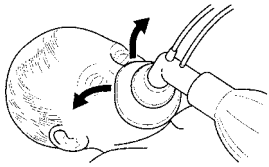
Turning it round

Inserting the oropharyngeal airway in an <u>older child</u>

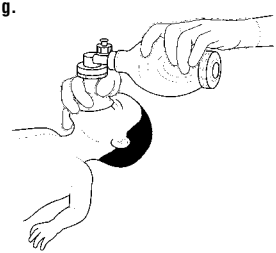
Chart 7. Rescue Breathing: bag-valve mask ventilation

- Choose a mask size that fits around the nose and mouth and ensure a proper seal between mask and face.
- Pull the jaw forward towards the mask with the third finger of the hand holding the mask. Do not hyperextend the neck.
- Ventilate at 40–60 breaths/min (each breath for 1 s) at 100% O_2 (10 L/min).

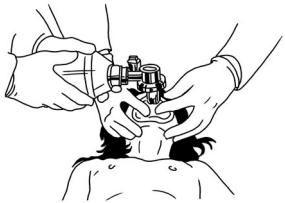
! Make sure the chest rises with each press on the bag.



Inadequate seal
If you hear air escaping from the mask, form a better seal. The commonest leak is between the nose and the cheeks.



One-rescuer technique



Two-rescuer technique

Chart 8. How to give oxygen

Give oxygen through nasal prongs or a non-rebreather face mask depending on which the child tolerates better and what is available.

Use of nasal prongs is the preferred method especially in young children, since it is usually better tolerated.

Nasal prongs

- Place the prongs just inside the nostrils and secure with tape on the cheeks near the nose (see figure). Keep the nostrils clear of mucus, which can block the oxygen flow.
- Start oxygen flow at 1–2 L/min to aim for an oxygen saturation of 94–98%.
- Monitor oxygen saturation with a pulse oximeter.

Face masks

Face masks (non-rebreather, possibly with a reservoir attached) are the preferred method for oxygen delivery in emergency situations when higher levels of oxygen concentration need to be delivered (e.g. in resuscitation, trauma, shock, convulsions, decreased level of consciousness).

- Place the face mask so that it covers the nose and mouth.
- Set the oxygen flow at minimum 4 L/min to avoid rebreathing of expired CO_2. If using a mask with reservoir, the flow of oxygen must be sufficiently high to avoid collapse of the reservoir during inspiration (up to 12–15 L/min). Aim for an oxygen saturation of 94–98%.
- Monitor oxygen saturation with a pulse oximeter.

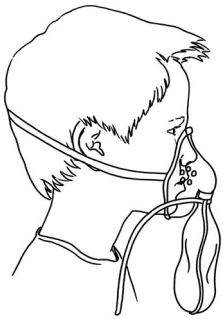
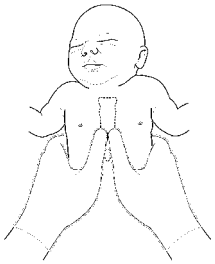


Chart 9. Giving chest compressions

Infant < 1 year of age

- Place thumbs on the lower half of the sternum (just below the line connecting the nipples).
- Compress one third of the anteroposterior chest diameter 100–120/min.

! Keep the compression depth steady the whole time.



Chest compressions: infant

Child > 1 year of age

- Position yourself vertically above the chest, with a straight arm.
- Place the heel of one hand over the lower half of the sternum. Lift the fingers to avoid pressure on the ribs.
- Compress one third of the anteroposterior chest diameter (5 cm) 100–120/min.

! Keep the compression depth steady the whole time.

! In larger children, it may be easier to use both hands with the fingers interlocked, avoiding pressure on the ribs.

Chest compressions: child

Chart 10. How to give intravenous fluids to a child in shock

- Insert an IV line.
- Give IV fluids (normal saline or balanced salt solution) 10–20 mL/kg over 30 mins. Make sure the infusion is running well.

! Caution: avoid aggressive fluid replacement in cardiogenic shock, severe anaemia, severe malnutrition, diabetic ketoacidosis, suspected raised intracranial pressure/cerebral oedema. If fluids need to be given in any of these conditions, infuse cautiously at a lower rate and over a longer period (e.g. 10–15 mL/kg over 60 min).

Age (weight)	Volume of fluid boluses	
	10 mL/kg	20 mL/kg
< 1 month (< 4 kg)	25	50
1–< 4 months (4–< 6 kg)	50	100
4–< 12 months (6–<10 kg)	75	150
1–< 3 years (10–< 15 kg)	130	250
3–< 5 years (15–< 20 kg)	170	350
5–< 10 years (20–< 30 kg)	250	500
10–< 13 years (30–< 40 kg)	350	700
13–< 15 years (40–< 50 kg)	450	900

Organize urgent referral to hospital. While waiting for transfer, monitor the child continuously:

- Stop fluid replacement if signs of fluid overload develop, e.g. pulse rate increases by 15/min, breathing rate increases by 5/min, liver and neck veins enlarge, fine crackles throughout lung fields.

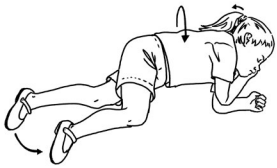
Reassess after first infusion (if referral is delayed):

- If no improvement and no signs of overhydration, consider repeating fluid boluses depending on the cause of shock until maximum volume.

Chart 11. How to position an unconscious child with normal breathing

No suspected neck trauma: recovery position

- Turn the child on the side to reduce the risk of aspiration.
- Keep the neck slightly extended and stabilize by placing cheek on one hand.
- Bend one leg to stabilize the body position.



Recovery position

Suspected neck trauma or cervical spine injury

- Stabilize the child's neck and keep the child lying on the back.
- Immobilize the cervical spine above and below the suspected level of injury with a well-fitting (semirigid) cervical collar to prevent any neck movement.

Cervical collar

If a cervical collar is not available or the fit is poor:

- Place the child in a neutral supine position on a rigid surface (spine board, if available).
- Immobilize the neck by supporting the child's head, e.g. with a rolled towel around the neck, sandbags or litre bags of IV fluid on each side.
- Tape the child's forehead and chin to the sides of a firm board to secure this position.

Chart 12. How to treat convulsions

Calculate drug dose based on child's weight or consult p. 762.

- **If convulsions last > 5 min**, give:
  - Diazepam rectally[a] 0.5 mg/kg; max. 20 mg, or slow IV injection 0.20–0.25 mg/kg; max. 10 mg ***or***
  - Midazolam by intranasal or buccal application or IM 0.2 mg/kg; max. 10 mg or slow IV injection at 0.15 mg/kg; max. 7.5 mg ***or***
  - Lorazepam slow IV injection at 0.1 mg/kg; max. 4 mg.
- **If convulsions continue after 10 min**, give a second dose of diazepam (or alternative). Do not give more than two doses.
- **If convulsions continue after 20 min**, **suspect status epilepticus**. Give:
  - Levetiracetam IV at 40–60 mg/kg over 15 min; max. 4.5 g ***or***
  - Phenytoin IV at 20 mg/kg over 20 min; max. 1.5 g: ensure a very good IV line, as extravasation causes local damage ***or***
  - Valproic acid IV at 40 mg/kg over 15 min; max. 3 g; avoid in cases of presumed hepatic failure or metabolic diseases ***or***
  - Phenobarbital IV at 15–20 mg/kg over 20 min; max. 1 g.
- **In newborns:** give phenobarbital IV at 20 mg/kg. If convulsions persist, give further doses at 10 mg/kg; max. 40 mg/kg.

! Caution: monitor for apnoea. Always have a bag and mask of appropriate size available in case the child stops breathing.

General and safety measures during convulsion

- Stay calm, monitor the child and the duration of the seizure.
- Protect the child from injury by moving away harmful objects.
- If the child is on the ground, put something soft under the head and loosen anything that is tight around the neck.

DO NOT put anything in the child's mouth.

DO NOT give any oral medication until the convulsion is controlled.

- Check for medical identification, e.g. medical alert bracelet.

If high fever:

- Undress the child to reduce the fever.
- After the convulsions cease and child is able to take medicines orally, give paracetamol or ibuprofen.

[a] Use commercially available rectal tubes or draw up the dose from a diazepam ampoule into a 1 mL syringe. Insert tube or syringe 4–5 cm into the rectum and inject the diazepam solution. Hold the buttocks together for a few minutes.

Chart 13. How to give glucose intravenously

Check blood glucose with glucose stick test (p. 790). If the blood glucose level is < 2.5 mmol/litre (45 mg/dL):

- Insert an IV line and give 3 mL/kg of 10% glucose solution rapidly (see table below)

Age (weight)	Volume of 10% glucose solution as bolus (3 mL/kg)
< 1 month (< 4 kg)	12 mL
1–< 4 months (4–< 6 kg)	15 mL
4–< 12 months (6–< 10 kg)	25 mL
1–< 3 years (10–< 15 kg)	35 mL
3–< 5 years (15–< 20 kg)	50 mL
5–< 10 years (20–< 30 kg)	75 mL
10–< 13 years (30–< 40 kg)	100 mL
13–< 15 years (40–< 50 kg)	150 mL

- Re-check the blood glucose in 30 min. If it is still low, repeat 3 mL/kg of 10% glucose solution.
- Feed the child as soon as he or she is conscious. If the child is unable to feed without danger of aspiration, give:
  - milk or sugar solution (dissolve four level teaspoons of sugar in a 200 mL cup of water) via a nasogastric tube or
  - IV fluids containing 5–10% glucose (dextrose).

Note: 50% glucose solution is the same as 50% dextrose solution. If only 50% glucose solution is available: dilute one part 50% glucose solution in four parts sterile water or one part 50% glucose solution plus nine parts 5% glucose solution.

Note: sublingual sugar may be used as an immediate "first aid" measure in managing hypoglycaemia if IV access is impossible or delayed. Place one level teaspoonful of sugar moistened with water under the tongue every 10–20 min.

9.4 Severe respiratory distress

- Respiratory distress may lead to respiratory failure or arrest.
- Try to keep the child calm, warm and comfortable.
- Give oxygen without upsetting the child.

History

- Sudden onset
- Fever
- Hoarse voice
- Cough: onset, duration, productive, bloody sputum, intermittent, barking
- Recent trauma
- Underlying conditions, e.g. asthma, sickle cell disease, heart disease
- Vaccination history: diphtheria, *Haemophilus influenzae* type b.

Assessment

Airway obstruction

- Air entry diminished, noisy stridor (upper airway), wheeze (lower airway)
- Paradoxical chest, abdominal movements ("seesaw" respiration)
- No breath sounds in complete airway obstruction ("silent chest").

Breathing abnormal

- Laboured, fast breathing, grunting or gasping
- Nasal flaring, severe chest indrawing, use of accessory muscles
- Unequal chest expansion in foreign body aspiration or pneumothorax
- Central cyanosis (late sign).

Other

- Sweating, cough, fever, hoarse voice, drooling, agitation, lethargy
- Upright position, unable to eat or talk, unable to feed (infants).

Investigations

- Pulse oximetry
- Blood glucose.

Table 129. Differential diagnosis of severe respiratory distress

Underlying cause	In favour
Anaphylaxis	• History of allergen exposure, sudden onset • Wheezing, stridor, urticaria, oedema of lips/face • May be associated with shock.
Asthma (p. 587)	• History of recurrent wheezing • Wheeze, reduced air entry, prolonged expiration • Response to bronchodilators.
Bronchiolitis (p. 194)	• Child aged < 2 years associated with cough, runny nose • Wheeze, prolonged expiration, reduced air entry, apnoea in young infants.
Croup, viral (p. 199)	• Barking cough, hoarse voice, stridor • Associated with upper respiratory tract infection.
Diphtheria (p. 201)	• "Bull neck" appearance • Red throat, grey pharyngeal membrane • Hoarse voice, stridor, cough • Not vaccinated against diphtheria (DTP or pentavalent).
Epiglottitis (p. 202)	• "Toxic" and anxious appearance • Muffled/hoarse voice, no cough, soft stridor • Drooling of saliva, inability to drink • Not vaccinated against *H. influenzae* type b.
Foreign body aspiration (p. 503)	• Sudden onset of choking, stridor • Focal reduced air entry or wheeze.
Heart failure (p. 328)	• History of heart disease or heart murmur • Abnormal heart rhythm (very fast or very slow) • Enlarged neck veins and liver • Fine crackles in the lung bases.
Pneumonia (p. 184)	• Cough, fever, lower chest wall indrawing, grunting.
Pneumothorax	• Sudden onset, usually after major chest trauma • Hyperresonance on percussion of one side • Unequal breath sounds.

Underlying cause	In favour
Poisoning (p. 748)	• History of drug overdose, recreational drugs or poison ingestion.
Retro-pharyngeal abscess (p. 200)	• Slow development over days, getting worse • Inability to swallow, high fever.

Treatment

KEEP CHILD CALM – CALL FOR HELP – MONITOR VITAL SIGNS

- Clear airway if necessary (p. 720).
- Give oxygen without upsetting the child (p. 723).
- If the child becomes unconscious → Provide life support (p. 718).

REFER URGENTLY TO HOSPITAL

Anaphylaxis

- Identify and remove allergen if still present.
- Give epinephrine (adrenaline) IM 0.01 mL/kg 1:1000 solution (1 mg = 1 mL). Repeat if no improvement after 5–10 minutes.
- Give IV fluids (normal saline or Ringer's lactate) 20 mL/kg as quickly as possible. Reassess regularly and check for signs of overinfusion before giving more fluids.
- If severe bronchospasm: give salbutamol (for dosages see asthma section below).
- Consider prednisolone orally 1–2 mg/kg (max. 60 mg/day) in children needing prolonged observation.

Asthma

- Give salbutamol via spacer (2–10 puffs; 100 µg per puff) or nebulized (2.5 mg in child < 20 kg, 5 mg ≥ 20 kg (0.15 mg/kg)), repeat as needed.

- Give ipratropium bromide, via spacer 160 µg or nebulized with salbutamol 250 µg in child < 30 kg, 500 µg ≥ 30 kg.
- Give prednisolone orally 1–2 mg/kg (max. 60 mg/day) or methylprednisolone IM 2 mg/kg (max. 60 mg/day).

Croup (viral)

- Give prednisolone orally 1 mg/kg or dexamethasone orally 0.6 mg/kg.
- Give nebulized epinephrine (adrenaline) 0.5 mL/kg 1:1000 solution (max. 5 mL/dose).

Foreign body aspiration

- If coughing is ineffective, give 5 back blows followed by 5 chest/abdominal thrusts, in infants: chest thrusts (p. 719).

Infections

- Consider giving pre-referral antibiotics if the hospital is far away. Consult the referral hospital. **DO NOT** give pre-referral antibiotics routinely. See disease-specific chapters.
  - — Pneumonia: ampicillin IV/IM 50 mg/kg
  - — Retropharyngeal abscess: co-amoxiclav IV/IM 50 mg/kg amoxicillin.

Tension pneumothorax

- Use large-bore cannula (e.g. 14 gauge) to relieve pressure in the chest (p. 797).

9.4 Shock

! The commonest cause of shock is hypovolaemia.

▶ **After you have assessed and managed AB (p. 716):**

History

- Fever (infection)
- Diarrhoea and/or vomiting
- Recent trauma and/or bleeding
- Underlying conditions, e.g. congenital or rheumatic heart disease
- Known allergies and recent allergen exposure.

Assessment

▶ **Assess for signs of shock:**

— Cool extremities
— Prolonged capillary refill time (> 2 s)
— Weak, fast pulse
— Low systolic blood pressure (Note: late sign, not always present).

▶ **Assess for other signs:**

— Any bleeding sites
— Fever, and/or non-blanching rash (petechiae or purpura)
— Severe dehydration (sunken eyes, skin pinch goes back very slowly, lethargic)
— Oedema or urticaria
— Engorged neck veins and liver.

Investigations

- Pulse oximetry
- Blood glucose.

Table 130. Differential diagnosis of shock

Underlying cause	In favour
Anaphylaxis	• History of allergen exposure, sudden onset • Wheezing, urticaria, oedema of lips/face.
Bleeding (bleeding shock)	• History of trauma or bleeding • Bleeding site.
Dehydration	• History of diarrhoea and vomiting or extensive burns • Polyuria or known diabetes mellitus.
Heart failure (cardiogenic shock)	• History of heart disease or heart murmur • Abnormal heart rhythm (tachycardia, bradycardia or arrythmia) • Enlarged neck veins and liver • Fine crackles in lung bases.
Septicaemia (septic shock)	• History of febrile illness • Very ill child, skin may be warm or cold • Petechiae/purpura may be present.
Other	• Other organs or systems involved (e.g. pneumothorax).

Treatment

KEEP CHILD CALM – CALL FOR HELP – MONITOR VITAL SIGNS

!

- Clear airway if necessary. Give oxygen (p. 723).
- IV access x 2 as large as possible. If IV access unsuccessful after two attempts (max. 5 min), insert an intraosseous needle (p. 795).

REFER URGENTLY TO HOSPITAL

- Manage shock as hypovolaemia unless you identified another cause. Give IV fluids (normal saline or Ringer's lactate): 10–20 mL/kg over 30 min, repeat if no improvement and no signs of overhydration (p. 725).

  Avoid aggressive fluid replacement in cardiogenic shock, severe anaemia, severe malnutrition, diabetic ketoacidosis, suspected raised intracranial pressure/cerebral oedema. If fluids need to

be given in any of those conditions, infuse cautiously at a lower rate over a longer period (e.g. 10–15 mL/kg over 60 min) and reassess.

- If the child becomes unconscious → Provide life support (p. 718).

Anaphylaxis

- Identify and remove allergen as appropriate.
- Give epinephrine (adrenaline) IM 0.01 mL/kg 1:1000 solution (1 mg = 1 mL). Repeat if no improvement after 5–10 minutes.
- Give IV fluids (normal saline or Ringer's lactate) 20 mL/kg as quickly as possible.
- If severe bronchospasm, give salbutamol via spacer (2–10 puffs; 100 µg per puff) or nebulized (2.5 mg in child < 20 kg, 5 mg ≥ 20 kg).
- Consider prednisolone orally 1–2 mg/kg (max. 60 mg/day) if prolonged observation is needed.

Cardiogenic shock/heart failure

- Avoid IV fluids if possible. However, children with preload insufficiency (due to low intake or associated sepsis) may benefit from cautious fluid resuscitation.
- Look for underlying cause, treat pneumothorax if present.

Haemorrhagic shock (bleeding)

- Stop bleeding (p. 744).
- Give IV fluids (normal saline or Ringer's lactate) 10–20 mL/kg over 30 min.

Hypovolaemic shock due to severe dehydration

- Give IV fluids (normal saline or Ringer's lactate) 10–20 mL/kg over 30 min, repeat up to 40–60 mL/kg within the first hour. Once child is stable, proceed with Diarrhoea treatment plan C (p. 283).

Septic shock (sepsis)

- Give IV fluids (normal saline or Ringer's lactate) 10–20 mL/kg over 30 min, repeat up to 40–60 mL/kg within first hour.
- Give antibiotics within the first hour (may be administered in hospital depending on referral time): ceftriaxone IV 100 mg/kg, in newborns cefotaxime IV 50 mg/kg (p. 761).

9.6 Lethargy – coma – convulsions

- Use the AVPU scale to assess the level of consciousness.
- If neck trauma suspected stabilize the child´s neck (p. 726).
- If stable and no neck trauma: place the child in the recovery position (p. 726).

▶ **After you have assessed and managed ABC (p. 716):**

History

- Fever (infection)
- Drug overdose (e.g. insulin) or poison ingestion
- Underlying conditions e.g. epilepsy, diabetes mellitus, (head) trauma, birth asphyxia
- Convulsion: length, general or focal.

Further assessment

▶ **Assess Disability and level of consciousness:**

— AVPU (**a**lert, responds to **v**oice, responds to **p**ain, **u**nresponsive)

— Lethargy (child not alert, but responsive to pain) or coma (child unresponsive to pain)

— Pupils (unequal or not reactive to light).

▶ **Assess for other signs:**

— Fever, non-blanching rash (petechiae or purpura)

— Convulsions

— Odd smell/foetor from mouth.

Investigations

- Pulse oximetry
- Blood glucose.

Table 131. Differential diagnosis of lethargy – coma – convulsions

Underlying cause	In favour
Convulsions (p. 469)	• Abnormal repetitive movements or shaking • Febrile convulsions associated with fever, in children aged 6 months to 5 years.
Dehydration (severe) (p. 275)	• History of diarrhoea and vomiting or extensive burns.
Diabetic ketoacidosis (p. 602)	• High blood glucose • History of polydipsia and polyuria • Acetone smell on breath; deep, rapid, sighing breathing (Kussmaul respiration) • Frequent vomiting and acute abdominal pain.
Encephalitis	• Altered mental status • Focal neurological signs, focal seizure, headache • May associate fever.
Head trauma (p. 493)	• Signs or history of head trauma.
Heat stroke (hyperthermia)	• History of sun exposure • Delirium, hallucinations, ataxia, dysarthria • Tachycardia, tachypnoea • Vomiting, diarrhoea.
Hypoglycaemia	• Low blood glucose < 2.5 mmol/ L (45 mg/dL) • Trembling/shaking • Rapid heart rate, palpitations • Sweating.
Meningitis (p. 172)	• Fever, stiff neck or bulging fontanelle, opisthotonus.
Poisoning (p. 748)	• History of drug overdose, recreational drugs or poison ingestion • Odd smell/ foetor from mouth.
Postictal state	• History of convulsion.

Underlying cause	In favour
Shock (p. 733)	• Cool extremities/capillary refill time > 2 s • Rapid, weak pulse.
Septicaemia	• History of febrile illness • Very ill child, skin may be warm or cold • Petechiae/purpura may be present.

Treatment

KEEP CHILD CALM – CALL FOR HELP – MONITOR VITAL SIGNS

!

- Manage ABC first: clear airway if necessary. Consider oropharyngeal airway (p. 721).
- Give oxygen.
- Vascular access (x 2).
- If the child becomes unconscious → Provide life support (p. 718).

REFER URGENTLY TO HOSPITAL

Convulsions

- Give short-acting benzodiazepine (p. 727).
- > 10 min: repeat benzodiazepine.
- > 20 min: suspect status epilepticus (p. 727).

Dehydration (severe)

- Start with Diarrhoea treatment plan C (p. 283): IV fluids (normal saline or Ringer's lactate) 30 mL/kg over 30 min (≥ 12 months of age) or 1 h (< 12 months of age).

Diabetic ketoacidosis

- Give IV fluids (without glucose) 10–20 mL/kg over 30 min.

Hypoglycaemia

- Give 10% glucose IV 3 mL/kg slowly (p. 728).

Head trauma

- Stabilize the neck, child lying on its back (p. 726).

Heat stroke (hyperthermia)

- Undress and apply ice packs to neck, axilla and groin.
- Give IV fluids (normal saline or Ringer's lactate) 20 mL/kg at room temperature.
- Stop cooling once core temperature < 38 °C.

DO NOT give paracetamol or ibuprofen.

Meningitis, encephalitis, septicaemia

- Give the first dose of antibiotics if referral is delayed: ceftriaxone IV or IM 50 mg/kg, in newborns cefotaxime IV 50 mg/kg (Table 138).

Poisoning

- Contact local poison centre for advice www.who.int/poisoncentres.
- Give specific treatment depending on the poison and the route of poisoning (p. 749).

Shock

- Treat shock as per C – circulation (p. 733).

9.7 Trauma

- If neck trauma suspected stabilize the child's neck (p. 726).
- Identify life-threatening injuries and consider treatment for shock.
- Ensure pain control.

▶ **After you have assessed and managed ABCDE (p. 716):**

History

- Time, mechanism and circumstances
- Loss of consciousness, amnesia or headache
- History of bleeding tendency
- Child abuse e.g. injuries not matching the given explanation, delay in presentation.

Further assessment

▶ **Primary survey:** assess and manage ABCDE (p. 716).

▶ Only when ABCD are stable, examine from head to toe, noting particularly:

- *Head:* scalp and eye abnormalities, external ears and periorbital soft tissue injuries
- *Neck:* penetrating wounds, subcutaneous emphysema, tracheal deviation and neck vein appearance
- *Neurological:* level of consciousness (AVPU), sensation and reflexes
- *Chest:* clavicles and all ribs, breath sounds and heart sounds
- *Abdominal:* penetrating abdominal wound requiring surgical exploration, bruising of the abdomen in the case of blunt trauma and rectal examination when necessary
- *Pelvis and limbs:* fractures, peripheral pulses, cuts, bruises and other minor injuries.

▶ Pain assessment (p. 506).

Table 132. Signs of specific trauma

Trauma	Signs
Fractures	• Swelling, deformity, unnatural movement, crepitus, loss of function, perfusion and/or sensation • Open or closed fracture.
Head trauma	• Decreased level of consciousness • Periorbital bruising, blood behind the eardrum, cerebrospinal fluid leak or bleeding from nose or ear • Unequal pupils.
Chest trauma	• Shortness of breath • Pneumothorax: decreased/no air entry on one side with hyperresonance on percussion on the same side • Hemothorax: decreased air entry on one side with hyporesonance on percussion on the same side, signs of shock.
Abdominal trauma	• Abdominal tenderness, distention • Bruising • Splenic rupture: pain, tenderness in upper left abdomen, signs of shock.

! Be aware of trauma mechanisms which are associated with high-risk injuries (Table 133). These injuries can be missed and a stable child may be at high risk of deterioration or even death (e.g. spleen injury in abdominal trauma). Refer to hospital (even if the child looks fine) for further assessment.

Table 133. Trauma mechanisms associated with high-risk injuries

Blunt injuries
• Motor vehicle collision: ejection from car, death of another passenger in same vehicle, vehicle roll-over, extrication time > 20 min • High-speed car crash: initial speed > 64 km/h, car deformity > 50 cm, intrusion into passenger compartment > 30 cm • Motorcycle crash > 32 km/h or with separation of rider from bike • Car-pedestrian injury with > 8 km/h impact or pedestrian thrown or run over • Fall from > 3 m height or more than 2–3 times the child's height.

Penetrating injuries

- Any penetrating injury to head, neck, chest, abdomen or extremities proximal to elbow or knee.

Treatment

KEEP CHILD CALM – CALL FOR HELP – MONITOR VITAL SIGNS

REFER URGENTLY TO HOSPITAL

- Always suspect head and spine injury in a trauma patient with altered mental status and stabilize the neck (p. 726).
- Give oxygen if concern of hypoxia.
- Cover wounds with sterile dressing.
- Leave any penetrating objects in place.
- In ongoing blood loss or poor perfusion, give IV fluids (normal saline or Ringer's lactate) via two large-bore IV sets.
- Treat pain (p. 508). If in severe pain, give morphine (0.4 mg/kg orally) or ketamine (1 mg/kg IV or 4 mg/kg intranasally) with midazolam (0.1 mg/kg IV or 0.2 mg/kg intranasally) under medical supervision. Monitor vital signs carefully and have a working bag and mask close by.
- Check tetanus status (vaccination completed + within past 5 years?) and administer tetanus prophylaxis, if needed.

DO NOT give the child anything to eat or drink.

- If the child becomes unconscious → Provide life support (p. 718).

Trauma with shock

- Stop any external bleeding by using direct pressure (p. 744).
- Give IV fluids (normal saline or Ringer's lactate) 10–20 mL/kg over 30 min.

Fractures

- Stabilize fractures by using splints.

Head trauma

- Stabilize the neck in neck trauma (p. 726).
- Elevate the head of the bed, stretcher or trolley to 30°.

Pneumothorax

- Use large-bore cannula (e.g. 14 gauge) to relieve pressure in chest (p. 797).

See pp. 485–498 for management of injuries that are not an emergency.

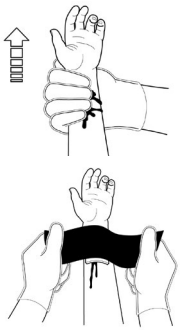
Chart 14. Controlling external bleeding

Controlling external bleeding

Direct pressure will control any bleeding:

- Elevate the limb, apply direct pressure, then put on a pressure bandage.
- Apply tourniquet in any uncontrolled external bleeding from extremities for periods of not more than 10 min: inflate a sphygmomanometer cuff above the arterial pressure.
- Prolonged use (> 10 min) of tourniquets can damage the extremity.

DO NOT use a tourniquet in a child with sickle cell anaemia.



Controlling external bleeding

9.8 Burns and scalds

- Identify life-threatening injuries and consider treatment for shock
- Cool fresh burns and scalds immediately
- Ensure appropriate pain control.

History

- Time, mechanism and circumstances:
  - Risk of inhalation injury and carbon monoxide intoxication (possible exposure to smoke or fire)
  - Risk of associated injuries (trauma while escaping a situation causing burns)
  - Mechanism of injury and length of exposure to estimate the depth of the burn
- Child abuse, e.g. injuries not matching the given explanation, delay in presentation.

Assessment

- **Assess and manage ABCDE** (p. 716), if needed.
- **Assess burns and scalds:**
  - Stridor, hoarseness (burns with inhalation of hot gases)
  - Area of burn: estimate the percentage of burned body surface area according to age (Chart 15). Alternatively, use the child's palm to estimate the burned area: a child's palm (including fingers) represents approximately 1% of the total body surface area
  - Depth of burn (Chart 15).
- **Assess pain (p. 506).**

Investigations

- Pulse oximetry

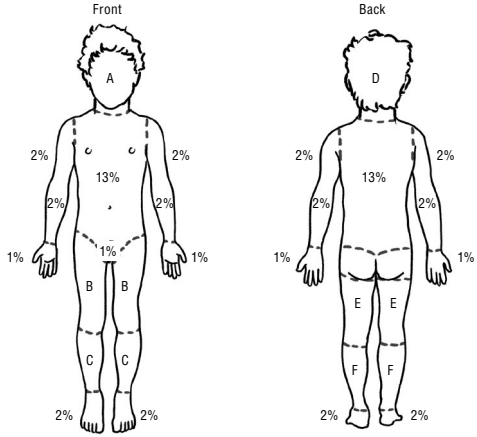
Chart 15. Assessment of burns

Depth of burn

Degree	Signs
1st	Erythema (red), no skin breaks
2nd	Blisters, painful, pink skin (superficial) or white skin (deep)
3rd	Charred (black), leathery skin, no sensation
4th	White or charred (black) skin, exposed muscle and bone

Estimated % of burned body surface in children at different ages

Estimate the total area burned by adding up the percentage of affected body surface areas as shown in the figure below; refer to the table for areas A–F, which change according to the age of the child.



Area	Age in years					
	0	1	5	10	15	Adult
Head (A/D)	10%	9%	7%	6%	5%	4%
Thigh (B/E)	3%	3%	4%	4%	4%	5%
Lower leg (C/F)	2%	3%	3%	3%	3%	3%

Note that front and back count the same

Treatment

- Run cold water over the burned area for five minutes; or immerse area in tepid water.
- Keep the child warm. **DO NOT** leave wet clothes on burns as this may result in hypothermia.
- Give IV fluids (Ringer's lactate) 10–20 mL over 30 min if burns covering > 10% total body surface.
- Treat pain (p. 506):
  - If in severe pain, give morphine (0.4 mg/kg orally) or ketamine (1 mg/kg IV or 4 mg/kg intranasally) with midazolam (0.1 mg/kg IV or 0.2 mg/kg intranasally) under medical supervision. Monitor vital signs carefully and have a working bag and mask close by.
- If the child becomes unconscious → Provide life support (p. 718).

Referral

- Refer urgently to hospital if:
  - Partial-thickness burns > 10% of the total body surface area
  - Full-thickness burns > 2% of the total body surface area
  - Third-degree burns
  - Burns involving face, hands, nipples, genitalia, joints
  - Inhalation injury
  - Circumferential extremity burns
  - Burns presenting with other trauma
  - High-voltage electrical burns, including lightning injury
  - Suspected child abuse
  - If the child needs referral DO NOT give the child anything to eat or drink.

See p. 492 for management of burns that are not an emergency and that do not need referral.

9.9 Poisoning

- Suspect poisoning in any unexplained illness in a previously healthy child
- Common and dangerous causes of poisoning among children and adolescents include paracetamol, psychiatric drugs, iron and other medications
- Identify poisoning that requires an urgent antidote (pp. 751–752).

History

- Route of poisoning: swallowed, inhaled, exposed, contact with eye
- Location and time of poisoning
- Poisoining agent: attempt to identify the exact agent involved, ask to see the container, label, sample of tablets, berries or any other suspected agent. For swallowed poisons, determine the amount ingested and frequency. Poisoning is considered to occur when intake is more than 5 times the recommended dose. Note that traditional medicines can be a source of poisoning. Some products causing drug poisoning in children may not be recognized by caregivers as drugs (e.g. cough medicines)
- Check that no other children were involved
- Any complaints e.g. nausea, burning pain in mouth, difficulty in breathing, headache, blurred vision, unconsciousness, seizures
- Accidental or intentional poisoning.

Assessment

- **Assess and manage ABCDE** (p. 716), if needed.
- **Assess for signs and symptoms of poisoning.**

Depending on the poisoning agent:

- Signs of burns in or around the mouth or stridor (suggest upper airway or laryngeal damage through ingestion of corrosives)
- Inhalation of irritant gases may cause swelling and upper airway obstruction, bronchospasm and pneumonitis
- Abnormal pupils (constricted, pinpoint pupils).
- **Assess pain (p. 506).**

Treatment

KEEP CHILD CALM – CALL FOR HELP – MONITOR VITAL SIGNS

!

- Stabilize the patient following the ABCDE approach (p. 716).
- Give oxygen if SpO_2 < 94%.
- Contact a poison centre for advice: www.who.int/poisoncentres.
- Give the antidote, if available and indicated (Table 134, p. 751).
- Treat pain according to severity (p. 506).
- Offer psychosocial support in self-harm poisoning (p. 530).
- If the child becomes unconscious → Provide life support (p. 718).

REFER URGENTLY TO HOSPITAL

Poison **swallowed**

- Wash out the mouth.

DO NOT induce vomiting

- Give activated charcoal, except for the following specific poisons: petroleum compounds, corrosive substances, alcohols, organophosphorus compounds, cyanides, and metal salts including iron and lithium salts.
  - — Mix the charcoal in 8–10 volumes of water, e.g. 5 g in 40 mL of water. If possible, give the whole amount at once: 1 g/kg for infants < 1 year, 25–50 g for children 1–12 years, 25–100 g for adolescents.
  - — **DO NOT** give activated charcoal to unconscious children.

Note: ingested poisons must be removed from the stomach. Gastric decontamination such as activated charcoal or gastric lavage is most effective within 1 h of ingestion. After this time, there is usually little benefit except if the swallowed poison delays gastric emptying. Weigh the likely benefits of gastric decontamination against the risks associated with each method. Gastric decontamination does not guarantee the removal of all the substance, so the child may still be in danger.

Poison **inhaled**

- Give oxygen if in respiratory distress, cyanosed or $SpO_2 < 94\%$.
- If bronchospasm, give bronchodilators (e.g. salbutamol).

Poison **contacted skin**

- Prevent poisoning of the rescuer by contact with the poisonous substance, e.g. contaminated clothing. Consider personal protective equipment (gloves, aprons) for all attending staff.
- Remove contaminated clothing.
- Rinse skin with running tepid water.
- Wash gently with soap and water.
- Removed clothing and personal effects should be stored safely in a see-through plastic bag that can be sealed, for later cleansing or disposal.

Poison **entered eye**

- Rinse the eye with saline or clean running water for 15 min, holding the eyelids open.
- Take care that the run-off does not enter the other eye if the child is lying on the side.
- When possible, the eye should be thoroughly examined under fluorescein staining for signs of corneal damage.

Table 134. Management of specific poisons

! Consult and refer as soon as possible. While awaiting referral, initiate treatment as below.

Corrosive compounds (sodium + potassium hydroxide, acids, bleaches, disinfectants)

DO NOT induce vomiting or use activated charcoal when corrosives have been ingested since this may cause further damage.

- Give milk or water as soon as possible to dilute the corrosive agent.

DO NOT give the child anything else to eat or drink.

Petroleum compounds (kerosene, turpentine substitutes, petrol)

DO NOT induce vomiting or give activated charcoal.

- Give oxygen if there is respiratory distress (p. 729).
- In the event of ingestion: give water as soon as possible to dilute the agent.

Organophosphorus and carbamate compounds (malathion, parathion, tetraethyl pyrophosphate, mevinphos, carbamates)

- Remove the poison by irrigating the eye or washing the skin (depending on location).
- Give activated charcoal within 4 h of ingestion. **DO NOT** induce vomiting.
- If the child has signs of excess parasympathetic activation (excessive bronchial secretion, salivation, sweating, slow pulse, small pupils, convulsions, muscle weakness or twitching, followed by paralysis and loss of bladder control, pulmonary oedema and respiratory depression), treat ABCDE and refer urgently to hospital for administration of atropine.

Aspirin and other salicylates

- Give activated charcoal. Several doses may be needed, as tablets tend to form a concretion in the stomach.

Iron

DO NOT give activated charcoal.

- Children who remain asymptomatic for the first 6 hours probably do not require an antidote.
- If there is clinical evidence of poisoning (nausea, vomiting, abdominal pain and diarrhoea, grey or black vomit and stools), refer urgently to the hospital for administration of antidote (deferoxamine).

Morphine and other opiates

- Give antidote naloxone IV 10 µg/kg: if IV is not feasible, give IM.
- If no response, give another dose of 10 µg/kg. Further doses may be required if respiratory function deteriorates.

Paracetamol

- If within 4 h of ingestion, give activated charcoal, if available, or induce vomiting unless an antidote is required (see below).
- If ingestion of 150 mg/kg or more, refer urgently to hospital for administration of antidote (oral methionine or IV acetylcysteine).

Carbon monoxide

- Give oxygen until signs of hypoxia disappear. Note that the child can look pink but still be hypoxaemic.
- Monitor with pulse oximeter (beware of falsely high readings!). If in doubt, be guided by clinical signs of hypoxaemia.

Button batteries (p. 506)

Referral

Refer to hospital as soon as possible (with information about the poison) if:

- Activated charcoal for ingested poisons is not available at your health facility
- Specific antidote is required
- Intentional ingestion of iron, pesticides, paracetamol or aspirin, narcotics or antidepressant drugs
- Ingested corrosives or petroleum products (observation required for at least 6 h)
- For eye contamination, if there is significant conjunctival or corneal damage.

Prevention of poisoning

See pp. 106–110 for counselling messages on prevention of unintentional injuries.

9.10 Envenoming

- Be aware of common venomous and poisonous animals (such as snakes, jellyfish and scorpions) in your area, how to recognize clinically relevant envenoming and available forms of specific treatment.
- Contact with venomous fish and box jellyfish stings is occasionally rapidly life-threatening.

History

- Type of venomous and poisonous animals (snake, scorpion)
- Any complaints e.g. nausea, vomiting, abdominal pain, difficulty breathing, headache, blurred vision, unconsciousness, seizures.

Assessment

- **Assess and manage ABCDE** (p. 716), if needed.
- **Assess signs of envenoming.**

Signs vary, depending on the venom and its effects:

- Local pain and swelling around the bite gradually extending up the bitten limb
- Local necrosis, bleeding or tender local lymph node enlargement around location of the bite
- Bleeding: external from gums, wounds or sores; internal, especially intracranial
- Signs of neurotoxicity: respiratory difficulty or paralysis, ptosis, bulbar palsy (difficulty in swallowing and talking), limb weakness
- Signs of muscle breakdown: muscle pain and black urine

- **Assess pain (p. 506).**

Treatment

KEEP CHILD CALM – CALL FOR HELP – MONITOR VITAL SIGNS

- Stabilize the patient following the ABCDE approach (p. 716), if needed, and consider urgent referral to hospital.
- Give oxygen if $SpO_2 < 94\%$.
- Treat pain according to severity (p. 506).
- If the child becomes unconscious → Provide life support (p. 718).
- If anaphylaxis develops, see p. 735.

Snake bite

- Lay the child down.
- Splint the limb to reduce movement and absorption of venom. Apply a firm elastic bandage to the entire affected limb, starting from the fingers or toes and covering the whole limb including the bite site.

DO NOT remove the bandage until reaching hospital

DO NOT cut or clean the wound or apply a tourniquet

- Give IV snake antivenom immunoglobulin, if available (type of antivenom depends on the snake).

Venomous fish

- Treat pain according to severity (p. 506).

Jellyfish

- Remove adherent tentacles carefully with tweezers.

DO NOT rub the sting, this may cause further venom discharge

DO NOT apply alcoholic solutions such as sun tan lotion, they may worsen the lesion

Scorpion sting

- Clean wound.
- Treat pain according to severity (p. 506). If very severe pain, infiltrate site with 1% lidocaine.
- Give IV scorpion antivenom serum, if available.

See p. 489 for management of other animal bites.

9.11 Drowning

History

- Time, mechanism, circumstances:
  - Duration of submersion
  - Mechanism of drowning
  - Type of body of water
  - Supervision of child, signs of child abuse or neglect
- Underlying medical conditions e.g. epilepsy, arrythmias, diabetes.

Assessment

- **Assess and manage ABCDE** (p. 716), if needed.
- Check if there are any injuries especially after diving or an accidental fall, e.g. facial, head and cervical spine injuries.

Investigations

- Core temperature
- Pulse oximetry
- Blood glucose.

Treatment

KEEP CHILD CALL – CALL FOR HELP – MONITOR VITAL SIGNS

!

- Give oxygen and ensure adequate oxygenation.
- Remove all wet clothes.
- If available, use a nasogastric tube to remove swallowed water and debris from the stomach.
- While waiting for urgent referral to hospital, warm the child externally: if the core temperature is > 32 °C, use radiant heaters or warmed dry blankets; if the core temperature is < 32 °C, use warmed IV fluid (39 °C).
- If the child becomes unconscious → Provide life support (p. 718).

REFER URGENTLY TO HOSPITAL

9.12 Electrocution

History

- Mechanism of electrocution, high/low voltage
- Any period of unconsciousness (due to arrythmia)
- Supervision of child, signs of child abuse or neglect

Further assessment

- **Assess and manage ABCDE** (p. 716).
- Traumatic injuries e.g. pneumothorax, peritonitis or pelvic fractures.

Treatment

KEEP CHILD CALM – CALL FOR HELP – MONITOR VITAL SIGNS

!

- Self-protection: ensure electricity is switched off, keep away from live wires.
- Provide emergency care by ensuring airway patency, breathing and circulatory support.
- Provide oxygen, especially for children with severe hypoxia, facial or oral burns, loss of consciousness or inability to protect the airway, or in respiratory distress.
- Begin fluid resuscitation with normal saline or Ringer's lactate in any patient with significant burns.
- Check tetanus status (vaccination completed + within past 5 years) and administer tetanus prophylaxis, if needed.
- Provide wound care, if needed (p. 485).
- If the child becomes unconscious → Provide life support (p. 718).

REFER URGENTLY TO HOSPITAL

9.13 Acute abdomen

- Treat shock and infection early.
- Give enough pain medication to control the pain.
- Do not give the patient anything to eat or drink in case of possible surgical intervention.

History

- Pattern of pain, e.g. focal/diffuse, steady/intermittent, colicky
- Vomiting, diarrhoea (bloody), constipation
- Fever, dysuria, cough
- History of trauma or abdominal surgery
- Underlying conditions, e.g. diabetes mellitus, inflammatory bowel disease.

Assessment

- **Assess and manage ABCDE** (p. 716), if needed.
- Check for:
  - Distended abdomen, scrotal swelling, signs of herniation
  - Signs of peritonitis: rigid abdomen, abdominal guarding, severe abdominal pain and tenderness that becomes worse with moving, coughing or pressing down, rebound tenderness.
  - Bruising, jaundice, petechiae/purpura.

Investigations

- Blood glucose
- Urine dipstick
- Pregnancy test, if indicated.

Differential diagnosis of acute abdomen

Abdominal pain is common in children and usually not an emergency. Table 135 lists only those causes of acute abdomen which need immediate emergency management and referral. See p. 308 for other causes of acute abdominal pain.

Table 135. Differential diagnosis of acute abdomen

Underlying cause	In favour
Abdominal trauma	• History of abdominal trauma, bruising.
Adhesions	• Abdominal surgery in the past.
Appendicitis	• Pain in the right lower quadrant, vomiting, rebound tenderness.
Bowel perforation	• History of inflammatory bowel disease, abdominal surgery.
Ectopic pregnancy	• Postmenarchal girl • Amenorrhoea, vaginal bleeding.
Foreign body ingestion (p. 505)	• History, young child.
Hernia (incarcerated) (p. 375)	• Inguinal/umbilical/scrotal swelling.
Intussusception	• Typical age: 2 months–2 years • Intermittent/colicky pain.
Peptic ulcer disease (p. 317)	• Epigastric pain, vomiting, haemorrhage.
Severe constipation (p. 315)	• < 3 stools weekly, painful defecation.
Testicular torsion (p. 369)	• Severe pain in genital area • Typical age: < 1 year, especially neonates, and adolescent males.
Volvulus	• Neonate, (bilious) vomiting.

Treatment

KEEP CHILD CALM – CALL FOR HELP – MONITOR VITAL SIGNS

REFER URGENTLY TO HOSPITAL

- Give IV fluids: 10–20 mL/kg normal saline or Ringer's lactate over 30 min (p. 725).
- Treat pain (p. 506):
  - If in severe pain, give morphine (0.4 mg/kg orally) or ketamine (1 mg/kg IV or 4 mg/kg intranasally) with midazolam (0.1 mg/kg IV or 0.2 mg/kg intranasally) under medical supervision. Monitor vital signs carefully and have a bag and mask close by.
- Do not give the child anything to eat or drink in case of possible surgical intervention.
- Contact referral facility for advice on pre-referral treatment (e.g. antibiotics if infection suspected).
- Consider giving pre-referral antibiotics (see relevant chapters for choice of antibiotics and dosages) if the referral is delayed.
- If the child becomes unconscious → Provide life support (p. 718).

9.14 Emergency drugs

This table provides the dosage, formulation and dose according to body weight of the enteral (**yellow cells**), parenteral (**pink cells**) and nebulized (**blue cells**) drugs commonly used in children and adolescents in emergency situation.

Drug	Dosage	Formulation	Dose according to age and body weight							
			< 4 months	4–12 months	1–2 years	3–4 years	5–9 years	10–12 years	13–14 years	≥ 15 years
			3– <6 kg	6– <10 kg	10– <15 kg	15– <20 kg	20– <30 kg	30– <40 kg	40– <50 kg	Adult
Adrenaline (see epinephrine)										
Cefotaxime	50 mg/kg/dose every 6 h (max. 12 g/day)	IV/IM: vial 250 mg to dissolve in 1 mL	1 mL*	1.5 mL	2–3 mL	3–4 mL	4–6 mL	6–8 mL	8–10 mL	12 mL
** For dosages and dosage intervals in newborns and premature infants up to 4.5 kg, see p. 836.*										
Ceftriaxone	50 mg/kg/dose once or twice a day (max. 12 g/dose)	IM: consult specific product labelling for reconstitution.	200 mg	400 mg	600 mg	900 mg	1–1.2 g	1.7 g	2.2 g	3 g
Dexamethasone Severe croup	0.6 mg/kg single dose (max. 16 mg/ dose)	Syrup 2 mg/5 mL Tablet 2 mg Tablet 4 mg	5 mL 1 ½	10 mL 2 1	– 4 2	– 5 2½	– – 4	– – 4	– – 4	– – 4
		IM: vial 4 mg/mL	0.6 mL	1.2 mL	1.8 mL	2.5 mL	4 mL	4 mL	4 mL	4 mL

Drug	Dosage	Formulation	Dose according to age and body weight							
			< 4 months	4–12 months	1–2 years	3–4 years	5–9 years	10–12 years	13–14 years	≥ 15 years
			3–<6 kg	6–<10 kg	10–<15 kg	15–<20 kg	20–<30 kg	30–<40 kg	40–<50 kg	Adult
Diazepam Convulsions	Rectal: 0.5 mg/kg (max. 20 mg/dose)	Rectal tubes 2.5 mg, 5 mg, 10 mg	2.5 mg[a]	5 mg	5 mg	10 mg	10 mg	15 mg	20 mg	20 mg
		Solution: 10 mg/2 mL	0.5 mL[a]	1 mL	1.25 mL	1.5 mL	2.5 mL	3.5 mL	4 mL	4 mL
	IV: 0.2–0.25 mg/kg (max. 10 mg/dose)	Solution 10 mg/2 mL	0.2 mL	0.4 mL	0.6 mL	0.75 mL	1.25 mL	1.75 mL	2 mL	2 mL
Epinephrine (adrenaline)										
Severe croup	0.5 mL/kg 1:1000 solution (max. 5 mL/dose)	Nebulized : solution 1:1000	–	3 mL	5 mL	5 mL	5 mL	5 mL	5 mL	5 mL
Anaphylaxis	≤ 6 years: 0.15 mL > 6 years: 0.3 mL	IM: solution 1:1000	0.15 mL	0.15 mL	0.15 mL	0.15 mL	0.3 mL	0.3 mL	0.3 mL	0.3 mL
Resuscitation	0.01 mg/kg (= 0.1 mL/kg every 3–5 min (max. 1 mg = 10 mL)	IV/intraosseous: solution 1:10 000	0.5 mL	0.7–1 mL	1–1.5 mL	1.5–2 mL	2–3 mL	3–4 mL	4–5 mL	5–10 mL
Note: *make up a 1:10 000 solution by adding 1 mL of 1:1000 solution to 9 mL of normal saline or 5% glucose*										
Glucose	3 mL/kg of 10% glucose solution rapidly IV (see p. 728).									

Ketamine Sedation, severe pain (trauma, burns)	Calculate **exact** dose based on the child's body weight or use the doses below only when this is not possible									
	Nasal: 4 mg/kg, half in each nostril (max. 50 mg = 1 mL per nostril)	Use IV form	–	30 mg	50 mg	70 mg	100 mg	100 mg	100 mg	100 mg
	Loading dose: 1 mg/kg	IV vial 50 mg /mL	–	8 mg	12 mg	15 mg	25 mg	35 mg	45 mg	60 mg
	Further dose (if required): 0.5 mg/kg (max. 100 mg/dose)		–	4 mg	6 mg	8 mg	12 mg	17 mg	25 mg	30 mg
Note: *not advised for children < 3 months.*										
Lorazepam Convulsions	0.1 mg/kg (max. 4 mg/dose)	IV 2 mg/mL	–	0.8 mg (0.4 mL)	1.2 mg (0.6 mL)	1.8 mg (0.9 mL)	2.5 mg (1.2 mL)	3.5 mg (1.7 mL)	4 mg (2 mL)	4 mg (2 mL)
Methyl-prednisolone	2 mg/kg, once a day (max. 60 mg/day)	IM 40 mg/mL IM 80 mg/mL	0.2 mL 0.1 mL	0.4 mL 0.2 mL	0.6 mL 0.3 mL	0.8 mL 0.4 mL	1.2 mL 0.6 mL	1.5 mL 0.75 mL	1.5 mL 0.75 mL	1.5 mL 0.75 mL
Midazolam Convulsions (for pain, see p. 830)	0.2 mg/kg (max. 10 mg/dose)	intranasal/buccal 5 mg/mL	–	1.5 mg (0.3 mL)	2.5 mg (0.5 mL)	3.5 mg (0.7 mL)	5 mg (1 mL)	7 mg (1.5 mL)	9 mg (1.2 mL)	10 mg (2 mL)
	0.2 mg/kg (max. 10 mg/dose)	IM 1 mg/mL	–	1.5 mg (1.5 mL)	2.5 mg (2.5 mL)	3.5 mg (3.5 mL)	5 mg (5 mL)	7 mg (7 mL)	9 mg (9 mL)	10 mg (10 mL)
	0.15 mg/kg (max 7.5 mg/dose)	IV 1 mg/mL	–	1.2 mg (1.2 mL)	1.8 mg (1.8 mL)	2.5 mg (2.5 mL)	4 mg (4 mL)	5 mg (5 mL)	7 mg (7 mL)	7.5 mg (7.5 mL)

Drug	Dosage	Formulation	Dose according to age and body weight							
			< 4 months	4–12 months	1–2 years	3–4 years	5–9 years	10–12 years	13–14 years	≥ 15 years
			3– <6 kg	6– <10 kg	10– <15 kg	15– <20 kg	20– <30 kg	30– <40 kg	40– <50 kg	Adult
Morphine	Calculate **exact** dose based on body weight of the child. Oral: first dose 0.4 mg/kg (max. 20 mg/dose), then 0.2 mg/kg every 4–6 h; increase if necessary for severe pain. IM: first dose 0.2 mg/kg, then 0.1 mg/kg every 4–6 h (max. 15 mg/day). IV: first dose 0.1 mg/kg, then 0.05 mg/kg every 4–6 h (max. 15 mg/day).									
Naloxone	10 µg/kg, repeat every 5 minutes if required (max. 400 µg/dose)	IV/IM vial: 400 µg/1 mL	0.1 mL	0.2 mL	0.3 mL	0.4 mL	0.6 mL	0.9 mL	1 mL	1 mL
Phenobarbital	For convulsions in newborn, calculate the **exact** dose based on body weight of the child. IV: loading dose 20 mg/kg. If convulsions persist, give further doses of phenobarbital 10 mg/kg up to a maximum of 40 mg/kg. IM/IV vial 200 mg/mL diluted with 4 mL sterile water									
Prednisolone	1 mg/kg twice a day	Syrup: 5 mg/mL Tablet 5 mg Tablet 25 mg	0.8 mL 1 –	1.6 mL 1–2 –	2.5 mL 2 ½	3.5 mL 3 ½	5 mL 5 1	– – 1–1½	– – 1½–2	– – 2

[a] Treat convulsions in newborns with phenobarbital.

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Notes

ANNEX 1

Organization of care at primary health care level

A1.1 Creating a child- and adolescent-friendly environment

Create a fun, kid-friendly and comfortable environment for children of all ages:

- Different areas set aside for children should be designed in a child-friendly way. Waiting areas can be equipped with a separate play area for younger children with toys, books, papers and colouring pencils and blackboards with chalks. There may also be information displays targeting children of different age groups.
- Make adolescents feel welcome through a separate adolescent-friendly place in your waiting room, with a few posters, flyers and comics. You may consider scheduling well-child visits for adolescents at separate hours from well-child visits for infants and children to make the adolescents feel more comfortable among peers of the same age.

A1.2 Triage at the first point of contact

Children should be assessed as soon as they arrive at the first point of contact in the facility for emergency and priority signs (see Chapter 9) to identify the few who need immediate emergency treatment and those who can safely wait. All staff, including non-medical staff and those working at the front desk and answering the telephone, need to be trained to do this first

rapid assessment on arrival of the child or when contact is made by phone. All staff should be able to give initial emergency treatment.

A1.3 Infection prevention and control

Appropriate patient placement and isolation

- Immediately isolate children with respiratory symptoms and suspected respiratory diseases (e.g. COVID-19, influenza) in a separate, well ventilated waiting room. If this is not possible, position them at least 1 metre apart from others. Give them medical masks to wear.
- The room or area should have dedicated toilets, hand hygiene stations, and waste bins for disposal of used paper tissues, if possible.
- To minimize risk of infection schedule well-child visits in the afternoon (ideally outside of school hours) while reserving the morning of the same day for sick visits. You could also have separate rooms for sick visits and well-child visits, if possible.

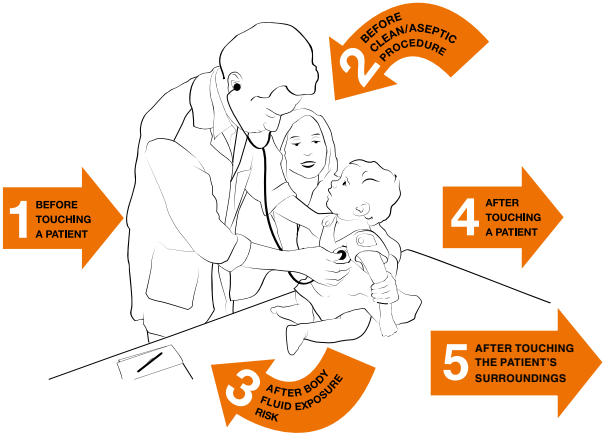
Apply standard infection prevention and control (IPC) precautions for all patients in the primary health care facility at all times to reduce the risk of transmission of bloodborne, respiratory and other pathogens.

Respiratory hygiene measures

- Display graphic information for patients on how to perform hand and respiratory hygiene (e.g. the need to cover nose and mouth with a tissue or bent elbow when coughing or sneezing).
- Perform hand hygiene after contact with respiratory secretions or objects that may be potentially contaminated.
- Give children with respiratory symptoms a medical mask to wear.

Hand hygiene

- Perform hand hygiene with an alcohol-based hand rub containing at least 70% alcohol at the following times (see illustration).
- Wash hands with soap and water when they are visibly soiled.



Personal protective equipment (PPE)

- Use PPE such as medical masks, gloves, gowns and eye protection to reduce exposure to pathogens when there is a risk of splashes or contact with patients' blood, body fluids, secretions, excretions and non-intact skin. Wear a medical mask at all times, if a highly contagious respiratory disease is suspected (e.g. COVID-19).
- Properly put on and remove PPE.
- Perform hand hygiene before putting on PPE and after removal.
- Fully remove PPE after use, before touching non-contaminated items and surfaces, and before going to another patient.

Prevention of needle-stick or sharps injuries

- Dispose of used needles and sharps safely in appropriate, puncture-resistant containers. Plan safe handling and disposal of needles before using them, e.g. make sure there is a safety box at arm's reach when you give an injection.
- Never recap a needle.
- Never fill a safety box more than three quarters full.

Cleaning and disinfecting equipment and the environment

- Clean and disinfect all surfaces in the facility routinely, especially high-touch surfaces, and whenever visibly soiled or if contaminated by body fluids. Wipe with detergent and then use approved disinfectant (e.g. 0.1% sodium hypochlorite).
- Clean and disinfect equipment regularly.
- If a highly contagious infectious disease is suspected (e.g. COVID-19): sanitize surfaces after each patient encounter. Avoid contaminating environmental surfaces, e.g. door handles and light switches.

Safe waste management

- Treat waste contaminated with blood, body fluids, secretions and excretions including human tissues and personal protective equipment as clinical waste, in accordance with regulations.

A1.4 Equipment

The following standard clinical and emergency equipment should be in place in all primary health care settings:

Standard equipment	
• Examination couch • Stethoscope • Thermometer • Penlight (torch) • Reflex hammer • Otoscope • Tourniquet • Sharps disposal container • Age-appropriate weighing scales • Stadiometer • Length board • Measuring tapes • Blood pressure measurement device: sphygmomanometer	• Age-appropriate blood pressure cuffs (infant, child, adult, thigh cuffs) • Pulse oximeter with child sensor • Visual acuity chart • Chart for colour vision testing • Cards for stereoscopic vision testing (Lang test) • Peak flow meter • Bilirubinometer • Electrocardiogram • Safe heat source (radiant warmer) • Refrigerator

Consumables

- Tongue depressors
- Urine bags
- Examination gloves (latex-free, non-sterile and sterile)
- Alcohol skin prep wipes and gauze
- IV cannulae and butterfly needles (14–24 gauge) with tape
- Needles (19–25 gauge)
- Syringes 1, 2, 5, 10, 20, 50 mL

Consumables

- Waterproof pen, drug labels, plain label
- Sterile dressing, splints, tape, scissors, suture needles, forceps, tissue glue
- IV administration set (burette/microdrip)
- Extension set with threeway taps/bungs
- Intraosseous needles
- Mucosal atomization device for nasal administration of drugs

Equipment for emergencies

- Bag-valve mask (450 and 1000 mL) with reservoir
- Face masks (sizes: 00, 0, 1, 2, 4)
- Non-rebreathing oxygen masks with reservoir (paediatric and adult)
- Oropharyngeal airways (sizes 00, 0, 1, 2, 3, 4, 5)
- Nebulizer or metered dose inhaler with spacer/masks for infants/children
- Oxygen cylinder with pressure regulator and tubing
- Nasal prongs (paediatric and adult)
- Portable suction device
- Soft suction catheters (sizes 5–16 F)
- Colour-coded tape/preprinted drug doses, algorithms, emergency protocol

A1.5 Emergency drugs

The following emergency drugs should be available in all primary health care settings for emergency situations:

- **Check emergency drugs regularly for:** easy access and clear order, dates of expiry and completeness and replace and restock if needed.
- **Ensure your team is trained to use them.**
- **Simulate emergencies and train your team regularly.**

Essential drugs:

- Oxygen
- Water for injection ampoules
- Saline ampoules
- 0.9% sodium chloride (normal saline) and balanced salt solution (Ringer's lactate) bags/bottles
- 10% glucose bottles
- Epinephrine (adrenaline) vial
- Salbutamol metered dose inhaler (aerosol)
- Salbutamol respiration solution (vial) for use in nebulizers
- Prednisolone oral liquid and tablets
- Methylprednisolone vial for injection
- Diazepam vial, midazolam vial or lorazepam vial
- Levetiracetam vial, phenytoin vial, valproic acid vial or phenobarbital vial for injection
- Antibiotics, e.g. ampicillin, ceftriaxone, cefotaxime, amoxicillin-clavulanate vials
- Activated charcoal

Other drugs (if possible or depending on the setting):

- Ketamine vial
- Morphine (hydrochloride or sulfate) oral solution
- Naloxone vial
- Antitetanus toxoid injection
- Snake and scorpion antivenom serum/immunoglobulin vial

A1.6 Laboratory tests and radiological investigations

Access to laboratory and radiological investigations based on the history and examination is needed to help narrow the differential diagnosis. Primary health care settings which provide paediatric care will have a range of different services available depending on the health system structure and the geographical location of the health facility in the country. Where services are part of a polyclinic with a range of health professionals and allied health staff, access to tests might be direct and immediate, whereas solo practices might have to refer elsewhere if they cannot provide the test themselves.

! Aim for a one-stop-shop approach to avoid unnecessary referral

- **Point-of-care or rapid diagnostic tests:** some tests may easily be performed at the point of care. The following equipment and basic laboratory investigations should be available in all primary health care settings:
  - Rapid streptococcal antigen detection test
  - Rapid capillary CRP test
  - Urine testing strips
  - Dip-slide urine culture
  - Glucometer or blood glucose strips
  - Pregnancy test
  - Transcutaneous bilirubinometer.

Indications for these tests are outlined in the appropriate sections of this book.

- **Blood for investigations** (full blood count, haemoglobin, iron studies, urea and electrolytes, liver function tests, inflammatory markers) and urine, pus and other samples for culture or molecular tests may be needed for further diagnosis. A link should be established to a laboratory and blood and other samples should be taken at the practice and sent to this laboratory. Results should be returned to the practice to avoid any loss to follow-up. If this is not feasible, tests may have to be arranged through referral of the patient.
- **Radiological and other imaging investigations:** if they cannot be done in the practice, X-ray and ultrasound may be available at polyclinics or arranged through referral.

- **Other investigations** (e.g. ECG, EEG) may be available at the practice or through referral. As for blood tests, arrangements should be made for speedy referral and directly obtaining results.

A1.7 Referral of newborns, children and adolescents

When organizing referral or transfer of a child to a hospital or specialist, the following factors need to be considered to ensure that the child arrives safely:

Communication with the family

- Explain to the parent or caregiver and the child (depending on age) why the child is being referred, what will happen in the hospital or at the specialist and how that will help the child.
- Calm the parents and reassure them that the referral hospital or specialist has the necessary expertise, equipment and personnel to properly diagnose and treat their child.

Communication with the referral hospital or specialists

- Communicate with the referral facility and provide information on the child you are referring.
- Write a short referral note containing:
  - Name and age of the child
  - Caregiver's details and contact numbers (particularly if separated from the child)
  - Date and time of referral
  - Reason for referral: complaints, symptoms, lab results, etc.
  - Treatment(s) given: time period, name and dosage of any drugs
  - In the event of newborn transfer: records of labour and childbirth and any treatments given to the mother and newborn
  - Any other relevant information: earlier illnesses and treatment, conditions (e.g. Down syndrome).
  - Your name and the practice name, your phone number and other contact details.

Organize transport for urgent hospital referrals

Special considerations apply when referring urgently in the event of an emergency:

Pre-referral

- Stabilize the child according to the ABCDE approach (p. 716).
- If the child is severely ill provide the first dose of the required medication before transfer, e.g. oxygen, antibiotics and pain management.

During transport

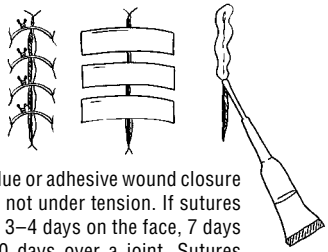
- Ensure that medically trained personnel are present during transport.
- Ensure that the transferring ambulance has resuscitation equipment for children, oxygen for transport, and a pulse oximeter.
- Parent(s) should be able to accompany the child during transfer. Do not separate mothers and newborns.
- In the event of newborn transfer: keep newborns warm.
- Ensure that the transferring ambulance has a functioning warm transport incubator.
- Wrap the baby in a soft, dry cloth; cover with a blanket and ensure that the baby's head is covered to prevent heat loss.
- If no advanced transport vehicle available transfer in kangaroo position (p. 123) with the mother or caregiver.

Notes

ANNEX 2

Practical procedures

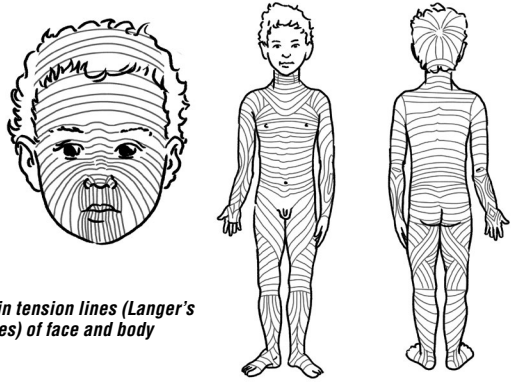
A2.1 Closing lacerations with sutures, glue and strips



For primary closure of lacerations sutures, glue and strips can be used. Lacerations that are older than 12 hours (24 hours, if on the face), very dirty, infected or from bites should not be managed by primary closure but allowed to heal by granulation.

Minor cuts can usually be closed with glue or adhesive wound closure strips as long as the aligned edges are not under tension. If sutures are required they can be removed after 3–4 days on the face, 7 days elsewhere on the body but left for 10 days over a joint. Sutures require local anaesthesia and are appropriate for gaping wounds.

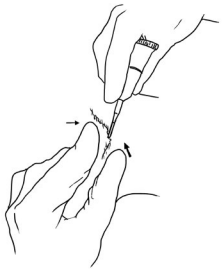
Primary closure with adhesive wound closure strips and tissue glue requires clean tissue which can be approximated without tension. Sutures, glue and strips can be combined.



Skin tension lines (Langer's lines) of face and body

Adhesive strips and glue provide good cosmetic results if the wound is not under tension and especially if the laceration follows Langer's lines in the skin and its edges are not ragged. Langer's lines are lines of natural tension. Apply adhesive strips transverse to the skin tension lines for optimal wound healing.

Applying tissue glue



Children find glue acceptable as a way to close wounds even though it stings a little while drying.

- To apply tissue adhesive (glue), the laceration must be dry.
- Bring the edges together by using a gauze pad or fingers, and apply several layers of glue to bind the wound edges together.
- Hold the wound edges together for at least one minute while the tissue adhesive dries.
- Remember that glue sticks to surgical gloves.

DO NOT use glue near the eye to prevent it from entering the eye. Use a gauze pad as a barrier. If the adhesive enters the eye or lids, wipe it off with gauze and flush with saline.

DO NOT allow glue to penetrate into the wound as this will prevent healing.

Applying adhesive strips

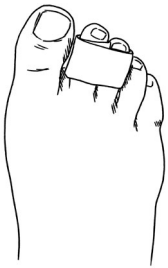
- Bring the wound edges together and apply the adhesive strips at right angles across the wound. There should be a little tension when bringing the edges together but not enough to wrinkle the skin.
- Apply as many strips as needed, separated from each other by about 5 mm. Lay another adhesive strip across the ends of the wound strips, parallel to the wound, to help prevent the child from picking at the strips.
- Adhesive strips will not stick to wet skin.

DO NOT apply circumferential adhesive strips around a finger as this might cause swelling and ischaemic damage.

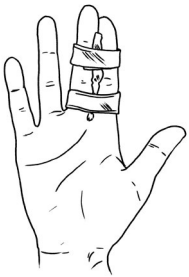
A2.2 Applying buddy strapping to digits

Buddy strapping is used when a finger or toe is injured and needs splinting for comfort and to allow healing without restricting joint movement.

- Strap the injured digit to a neighbouring digit.
- Place a small dressing or piece of gauze between the toes or fingers you are going to strap together to prevent rubbing and possible infection.
- The strapping should be firm but not tight. When buddy strapping the fingers, avoid taping over the joints: functional use of the hand should still be possible.



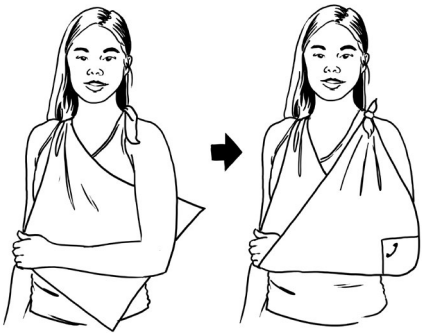
Buddy strapping of toes



Buddy strapping of fingers

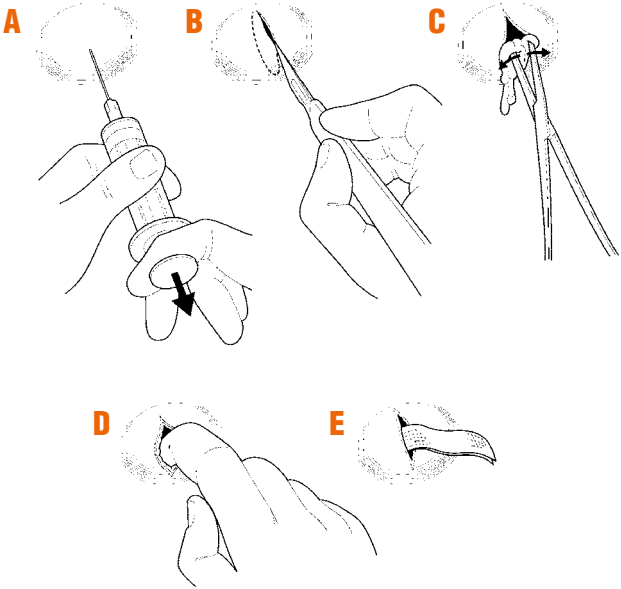
A2.3 Applying an arm sling

- Ask the child to support their arm with their other hand. Gently slide a triangular bandage underneath the arm. The point of the triangle should be underneath the elbow of the injured arm. Bring the top end of the bandage around the back of the neck.
- Fold the lower tip of the triangular bandage up over the forearm to meet the top of the bandage at the shoulder of the injured side.
- Tie the two ends of the bandage in a reef knot above the child's collarbone.
- Adjust the sling so that it supports the arm all the way to the end of the little finger.
- Secure the edge of the bandage at the elbow by twisting the fabric and tucking it in, or by using a safety pin to fasten it.
- Check the circulation of the child's fingertips. Press their nail for 5 seconds until it turns pale, then release to see if the colour returns within 2 seconds. Repeat after 10 minutes. If circulation is compromised, refer to a specialist or hospital urgently.



A2.4 Incision and drainage of an abscess

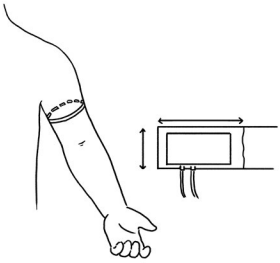
The steps of an incision and drainage of an abscess are described in the following illustrations.



Incision and drainage of an abscess. *A: aspirating to identify site of pus (send to the laboratory, if available, and always do microscopy and culture for TB); B: elliptical incision; C–D: breaking up loculations; E: loose packing in place*

A2.5 Measuring blood pressure

- Ensure a quiet, relaxed and comfortable setting.
- Preferably use an automated non-invasive blood pressure (BP) device with the appropriate size of cuff for the child's mid-upper arm circumference. See illustration below.



***Appropriate size of cuff**: bladder length 75–100% of the upper mid-arm circumference and a bladder width of 37–50% of the mid-upper arm circumference.*

Position for blood pressure measurement in a child or adolescent

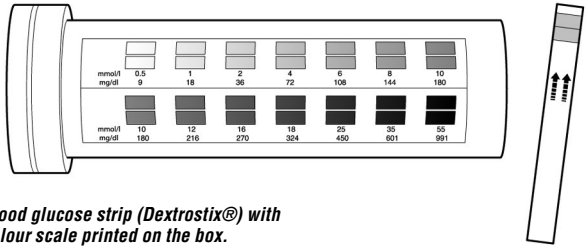
- Ask the patient to relax and to sit on a chair with their feet on the floor, legs uncrossed, back supported, ideally for at least 5 minutes. In infants, measure BP in the supine position.
- Measure BP preferentially in the right arm.
- Support the patient's arm (i.e. resting on a desk with a pillow or book to adjust arm height) so that the middle of the cuff is at heart level.
- Neither the patient nor the observer should talk during the process.
- Repeat the process after 1–2 minutes if the measurement is high, and when following up children with known high BP.
- Record the BP reading (average of the last 2 readings in the event of several measurements).

A2.6 Measuring blood glucose

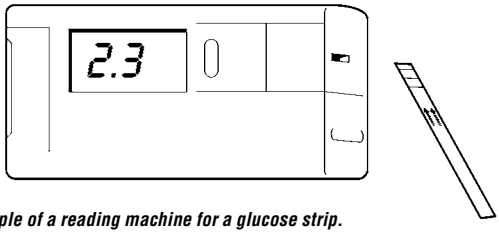
- Blood glucose can be measured by a rapid diagnostic test in the practice which provides an estimate of blood glucose within a few minutes. There are several brands on the market, and they differ slightly in how they should be used. Instructions on the box and package leaflet must therefore be read before use.
- Generally, a drop of blood is placed on the reagent strip (it should cover the entire reagent area) and left for 30 s to 1 min, depending on the

brand of strip. The blood is then wiped or washed off gently with drops of cold water, and after another fixed period (e.g. a further minute), the colour changes on the reagent field of the strip. The strip is then read and compared with a colour scale printed on the box or the blood glucose reader. This allows estimation of the glucose level within a certain range, e.g. between 2 and 5 mmol/L, but does not give an exact determination.

- Some strips come with an electronic reading machine, which has a battery as its power source. After the blood is wiped off, the strip is inserted into the reading machine, which provides a more accurate value.
- Since the reagents deteriorate with exposure to ambient humidity, they must be kept in a sealed box at 2–3 °C, avoiding sunlight or high humidity. The box must be closed again immediately after a strip has been taken out.



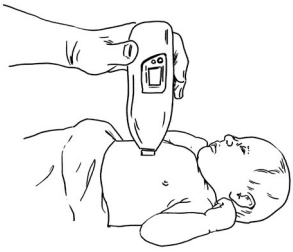
Blood glucose strip (Dextrostix®) with colour scale printed on the box.



Example of a reading machine for a glucose strip. The strip is inserted into a slot on the right side of the machine.

A2.7 Measuring bilirubin with a transcutaneous bilirubinometer

A transcutaneous bilirubinometer is used to measure bilirubin levels in a newborn with jaundice (p. 148). While each transcutaneous bilirubinometer has a different detailed operating procedure, the basic principle remains the same:



Apply gentle pressure. The optic head should make full contact with the neonate's skin without any gaps.

- Choose a site of measurement: commonly used sites are the forehead and the sternum.
- Place the bilirubinometer's probe tip/optical head flat against the baby's skin, not at an angle, and press lightly. For correct measurement, the optic head should make full contact with the skin without any gaps. This is usually achieved by gentle pressure.
- Avoid taking measurements against bruises, birthmarks and subcutaneous haematomas. Hyperaemia at the test site may affect the results.

A2.8 Giving injections

First, find out whether the child has reacted adversely to drugs in the past. Wash your hands thoroughly. Use disposable needles and syringes. Clean the chosen site with an antiseptic solution. Carefully check the dose of the drug to be given, and draw the correct amount into the syringe. Expel the air from the syringe before injecting. Always record the name and amount of the drug given. Discard disposable syringes in a safe container.

Intramuscular and subcutaneous

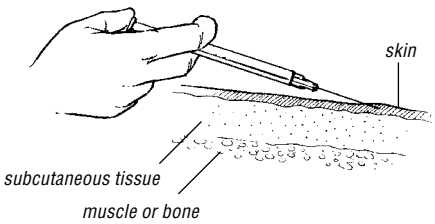
- In children aged > 2 years, give the injection into the outer thigh midway

between the hip and knee (*M. vastus lateralis*). In younger children, inject into the thigh or over the deltoid muscle in the upper arm.

- **Intramuscular:** push the needle (23–25 gauge) into the muscle at a 90° angle.
- **Subcutaneous:** push the needle (23–25 gauge) under the skin at a 45° angle into the subcutaneous fatty tissue. Do not enter the underlying muscle.
- Give the drug by pushing the plunger slowly all the way down. Remove the needle, and press a small swab or cotton wool firmly over the injection site.

Intradermal

Select an undamaged, uninfected area of skin (e.g. over the deltoid in the upper arm). Stretch the skin between the thumb and forefinger of one hand; with the other slowly insert the needle (25 gauge), bevel upwards, about 2 mm just under and almost parallel to the surface of the skin. Considerable resistance is felt when injecting intradermally. A raised, blanched bleb showing the surface of the hair follicles is a sign that the injection has been given correctly.



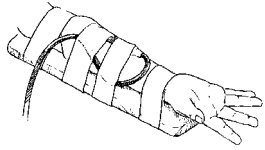
Intradermal injection (for example in the Mantoux test)

A2.9 Giving parenteral fluids

Select a suitable vein to place the cannula or a gauge 21 or 23 butterfly needle.

Peripheral vein

- Identify an accessible peripheral vein. In young children aged > 2 months, this is usually the cephalic vein in the antecubital fossa or the fourth interdigital vein on the dorsum of the hand.



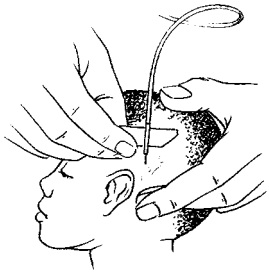
Splinted arm for IV infusion to prevent bending of the elbow

- An assistant should keep the position of the limb steady and act as a tourniquet by obstructing the venous return with his or her fingers lightly closed around the limb.
- Clean the surrounding skin with an antiseptic solution (e.g. surgical spirit, iodine, isopropyl alcohol or 70% alcohol), then introduce the cannula into the vein and insert most of its length. Fix in place securely with tape, and splint the limb in an appropriate position (see illustration).

Scalp vein

These are often used in children aged < 2 years but are most suitable in young infants.

- Find a suitable scalp vein (usually in the midline of the forehead, the temporal area, or above or behind the ear).
- Shave the area if necessary, and clean the skin with an antiseptic solution.
- The assistant should occlude the vein caudally to the puncture site. Fill a syringe with normal saline, and flush the butterfly set. Disconnect the syringe and leave the end of the tubing open. Introduce the butterfly needle as described above. Blood flowing back slowly through the tubing indicates that the needle is in the vein.



Inserting a butterfly needle into the scalp vein to set up an IV infusion in a young infant

- Care should be taken not to cannulate an artery, which is recognized by palpation. If there is a pulsatile spurting of blood, withdraw the needle and apply pressure until the bleeding stops; then look for a vein.

Care of the cannula

- Secure the cannula when introduced. This may require splinting neighbouring joints to limit the movement of the catheter. Keep the overlying skin clean and dry. Flush and fill the cannula with normal saline immediately after the initial insertion and after each injection.

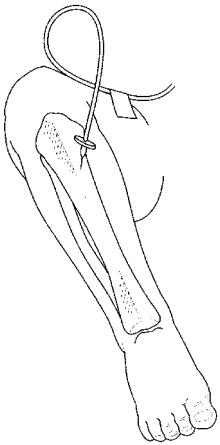
Intravenous drug administration through an indwelling cannula

- Attach the syringe containing the IV drug to the injection port of the cannula and introduce the drug. Once all the drug has been given, flush with normal saline until all the blood has been expelled and the catheter is filled with the saline solution.
- If infusion through a peripheral vein or scalp vein is not possible, and it is essential to give IV fluids to keep the child alive, set up an intraosseous infusion (see below).

Intraosseous infusion

Intraosseous infusion is a safe, simple, reliable method of giving fluid and drugs in an emergency when venous access is not possible.

The first choice for the puncture is the proximal tibia. The site for needle insertion is in the middle of the anteromedial surface of the tibia, at the junction of the upper and middle third, to avoid damaging the epiphyseal plate (which is higher in the tibia) or at least 1–2 cm below the tibial tuberosity. An alternative site for needle insertion is the distal femur, 2 cm above the lateral condyle.



Intraosseous infusion. Infusion needle in place in the anteromedial surface at the junction of the upper and middle third of the tibia.

- Prepare the necessary equipment:
  - — bone marrow aspiration or intraosseous needles (15–18 gauge or, if not

available, 21 gauge). If these are not available, bone marrow needles or large-bore hypodermic or butterfly needles can be used in young children

- antiseptic solution and sterile gauze to clean the site
- a sterile 5 mL syringe filled with normal saline and a second sterile 5 mL syringe
- IV infusion equipment
- sterile gloves.

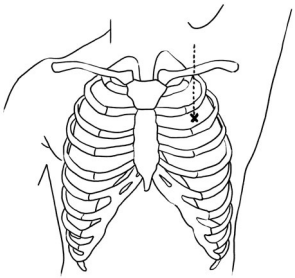
- Place padding under the child's knee so that it is bent 30° from the straight (180°) position, with the heel resting on the table.
- Locate the correct position (described and shown above).
- Wash the hands and put on sterile gloves.
- Clean the skin over and around the site with an antiseptic solution.
- Stabilize the proximal tibia with the left hand (this hand is now not sterile) by grasping the thigh and knee above and lateral to the cannulation site, with the fingers and thumb wrapped around the knee but not directly behind the insertion site.
- Palpate the landmarks again with the sterile glove (right hand).
- Insert the needle at a 90° angle with the bevel pointing towards the foot.
- Advance the needle slowly using a gentle but firm, twisting or drilling motion.
- Stop advancing the needle when you feel a sudden decrease in resistance or when you can aspirate blood. The needle should now be fixed in the bone.
- Remove the stylet.
- Aspirate 1 mL of the marrow contents (looks like blood), using the 5 mL syringe, to confirm that the needle is in the marrow cavity. **Note:** failure to aspirate marrow contents does not mean that the needle is not correctly placed.
- Attach the second 5 mL syringe filled with normal saline. Stabilize the needle and slowly inject 3 mL while palpating the area for any leakage under the skin. If no infiltration is seen, start the infusion.
- Apply dressings and secure the needle in place.
- Monitor the infusion by the ease with which the fluid flows and the patient's clinical response.

- Check that the calf does not swell during the infusion.
- Stop the intraosseous infusion and remove the needle as soon as venous access is available. In any case, intraosseous infusion should not last for more than 8 h.

A2.10 Needle thoracocentesis

This procedure is used for a rapidly deteriorating patient who has a life-threatening tension pneumothorax often following trauma to the chest.

- Place trauma patient in head-up, supine position. All other patients should be placed in a 45-degree sitting position with the arm that is on the same side as pneumothorax placed over the forehead.
- Identify the second intercostal space in the midclavicular line on the side of the pneumothorax (the same side as the hyperresonant lung).
- If there is sufficient time (i.e. patient stable): swab the chest wall with antiseptic or an alcohol swab.
- Attach the syringe filled with a few millilitres of 0.9% NaCl to the intravenous cannula (use a large-bore cannula e.g. 14 gauge).
- Insert the cannula into the chest wall in the second intercostal space just above the lower rib, aspirating all the time.
- Once air is aspirated, remove the trocar needle, leaving the cannula in place.
- Tape the cannula securely to the chest skin, and arrange for urgent transfer to hospital as soon as possible (insertion of a chest drain may be needed).



Notes

ANNEX 3

WHO Growth charts

A3.1 Calculating a child's weight-for-age

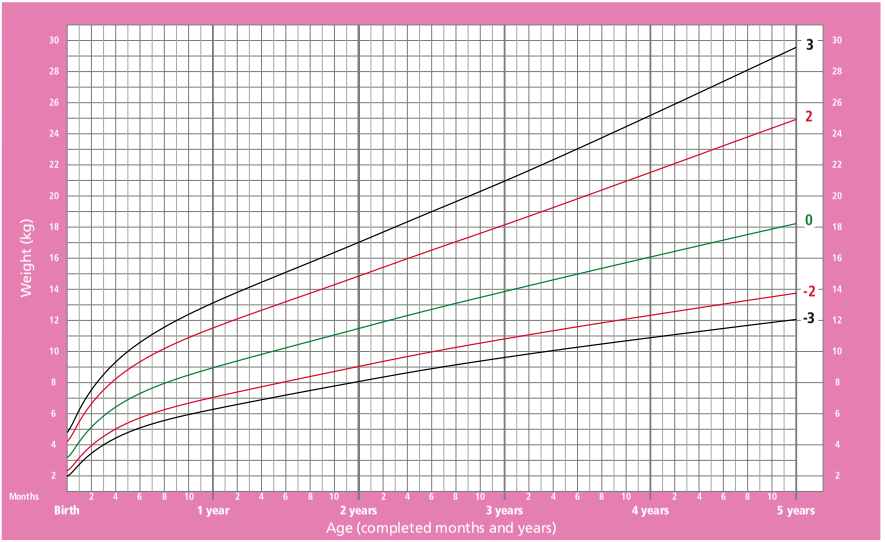
To calculate a child's weight-for-age, use the reference charts below or the reference tables online:
https://www.who.int/tools/child-growth-standards/standards.

In the charts:

- Locate the appropriate chart for boys or girls.
- To plot weight-for-age:
  - Find the child's age in completed months or years on the x-axis.
  - Find the child's weight in kg on the y-axis.
  - Plot the child's weight-for-age as a dot where the vertical and horizontal lines identified for the age and weight intersect.
- When points are plotted for two or more visits, connect adjacent points with a straight line to better observe trends.

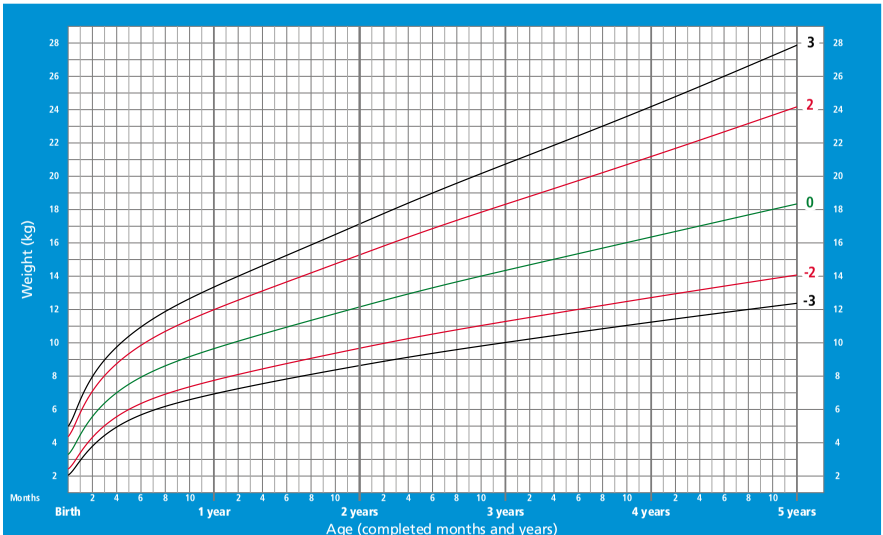
Weight-for-age GIRLS

Birth to 5 years (z-scores)



Weight-for-age BOYS

Birth to 5 years (z-scores)



A3.2 Calculating a child's length- or height-for-age

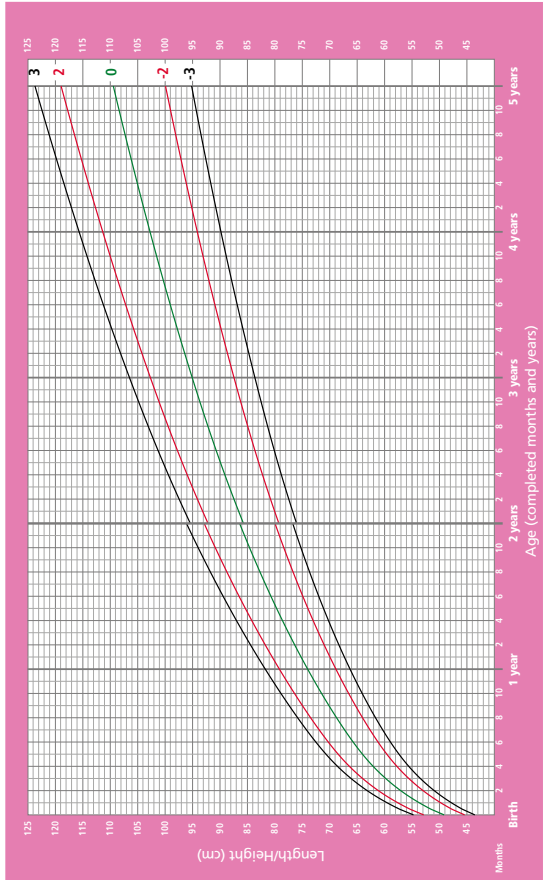
To calculate a child's length-for-age or height-for-age, use the reference charts below or the reference tables online: https://www.who.int/tools/child-growth-standards/standards.

See p. 21 on how to measure length (from birth to 2 years) and height (from 2 years).

In the charts:

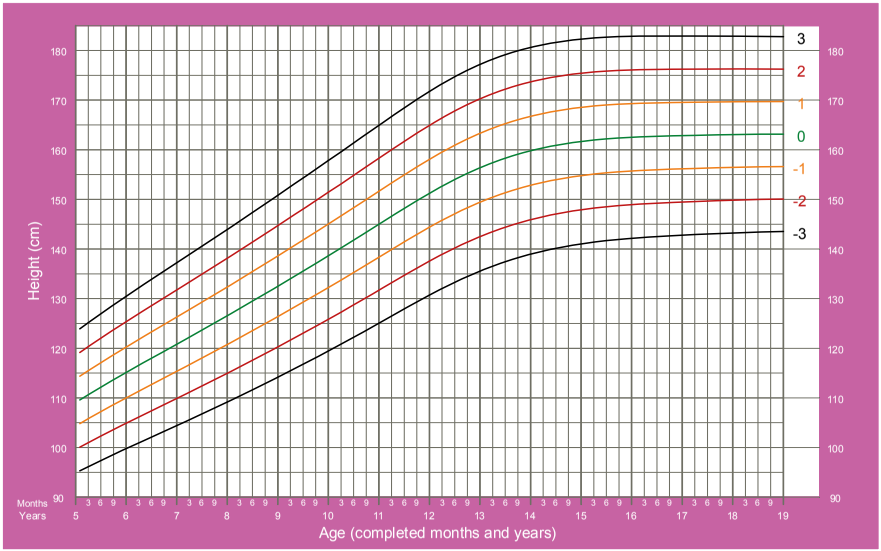
- Locate the appropriate chart for boys or girls.
- Plot length- or height-for-age:
  - Find the child's age in completed months or years on the x-axis and plot the age on a vertical line.
  - Find the child's length/height in cm on the y-axis and plot length or height on a horizontal line.
  - Plot the child's length- or height-for-age as a dot where the vertical and horizontal lines identified for the age and length/height intersect.
- When points are plotted for two or more visits, connect adjacent points with a straight line to better observe trends.

Girls: length- or height-for-age



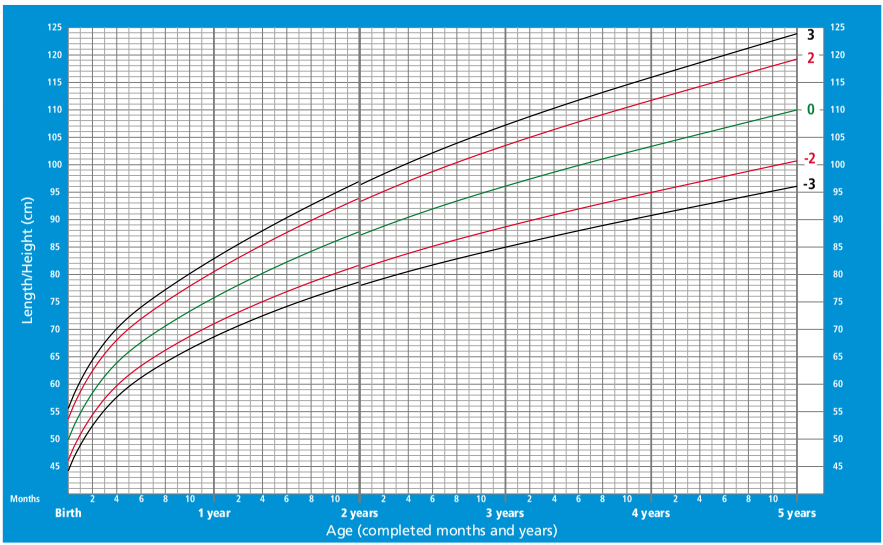
Height-for-age GIRLS

5 to 19 years (z-scores)



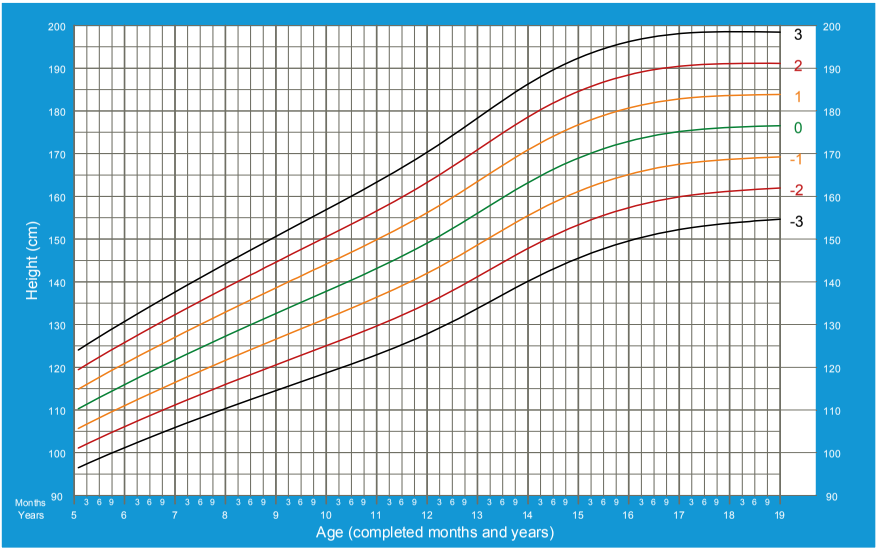
Length/height-for-age BOYS

Birth to 5 years (z-scores)



Height-for-age BOYS

5 to 19 years (z-scores)



A3.3 Calculating a child's weight-for-length or -height

The following charts (pp. 809–810) give the WHO normalized reference weight-for-length (45–120 cm), by sex.

"Length" in most cases is measured for a child < 85 cm, and "height" for a child ≥ 85 cm. Recumbent length is on average 0.5 cm greater than standing height, although the difference is of no importance for the individual child. A correction may be made by deducting 0.5 cm from all lengths > 84.9 cm if standing height cannot be measured.

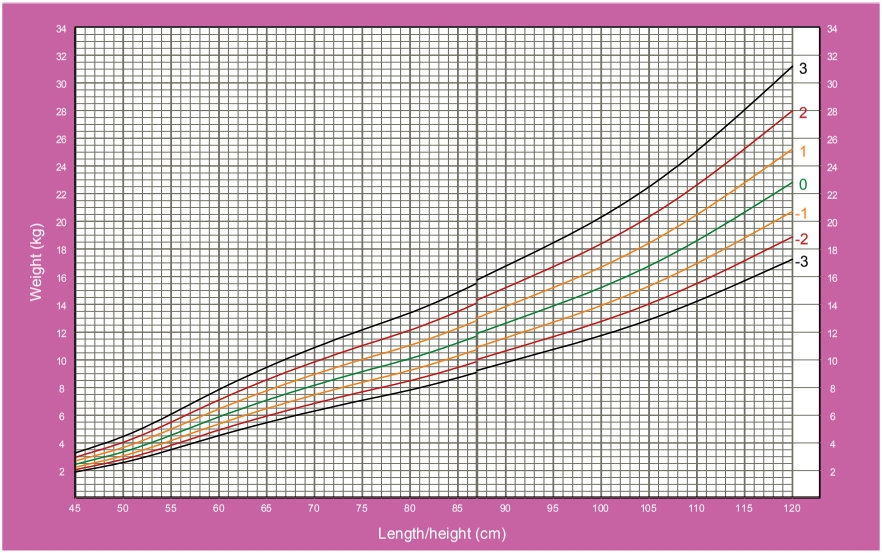
Determine a child's weight-for-length or weight-for-height using the reference charts below or the reference tables online: https://www.who.int/tools/child-growth-standards/standards.

In the charts:

- Locate the appropriate chart for boys or girls.
- To plot weight-for-length or weight-for-height:
  - Find the child's length or height in cm on the x-axis and plot the height or length on a vertical line.
  - Find the child's weight on the y-axis and plot the weight in kg on a horizontal line.
  - Plot the child's weight-for-length or -height as a dot where the vertical and horizontal lines identified for the age and length or height intersect.
- When points are plotted for two or more visits, connect adjacent points with a straight line to better observe trends.

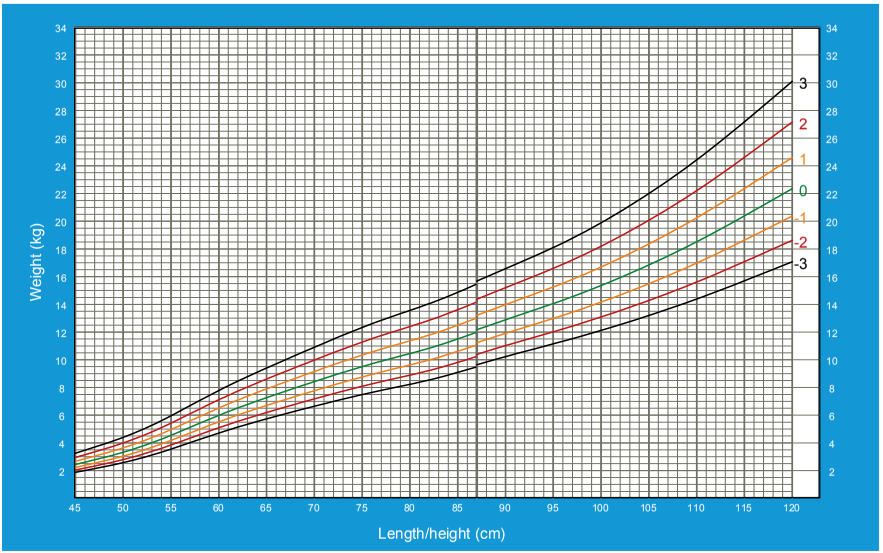
Weight-for-length/height GIRLS

Birth to 5 years (z-scores)



Weight-for-length/height BOYS

Birth to 5 years (z-scores)



A3.4 Calculating a child's BMI-for-age

The following charts (pp. 812–815) give the WHO normalized reference BMI-for-age, by sex. Calculate BMI from a child's weight and length/height by using a calculator: BMI = kg/m^2: weight in kilograms/height in metres squared).

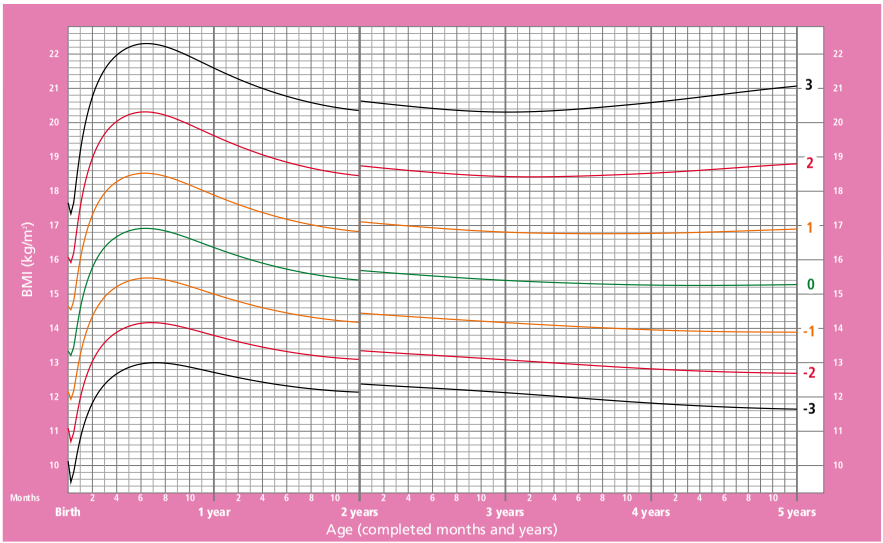
Determine a child's BMI-for-age, using the reference charts below or the reference tables online:
https://www.who.int/tools/child-growth-standards/standards.

In the charts:

- Locate the appropriate chart for boys or girls.
- Plot BMI-for-age:
  - Find the child's age in completed months of years on the x-axis and plot the age in completed months or years on a vertical line (not between vertical lines).
  - Find the child's BMI on the y-axis and plot BMI on a horizontal line (e.g. 14, 14.2), or in the space between lines (e.g. 14.5). If a calculator was used to determine BMI, it may be recorded and plotted to one decimal place.
  - Plot the child's BMI-for-age as a dot where the vertical and horizontal lines identified for the age and BMI intersect.
- When points are plotted for two or more visits, connect adjacent points with a straight line to better observe trends.

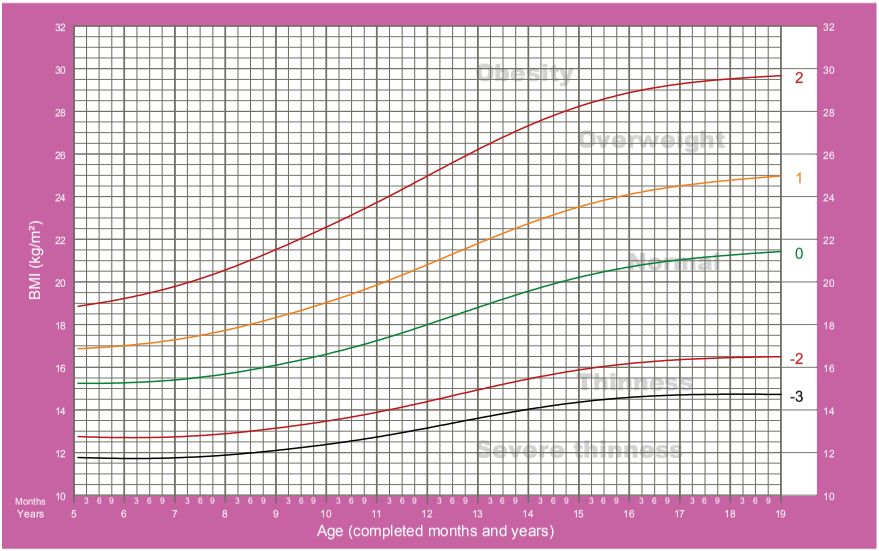
BMI-for-age GIRLS

Birth to 5 years (z-scores)



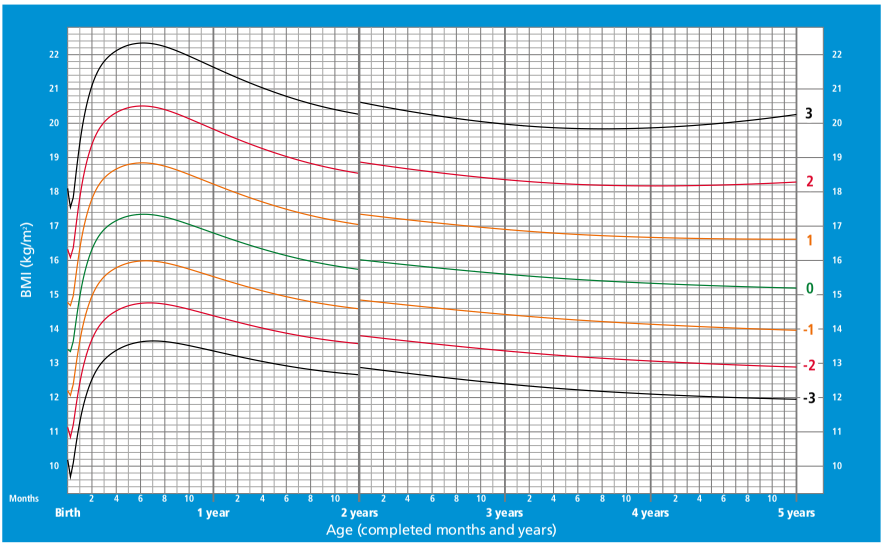
BMI-for-age GIRLS

5 to 19 years (z-scores)



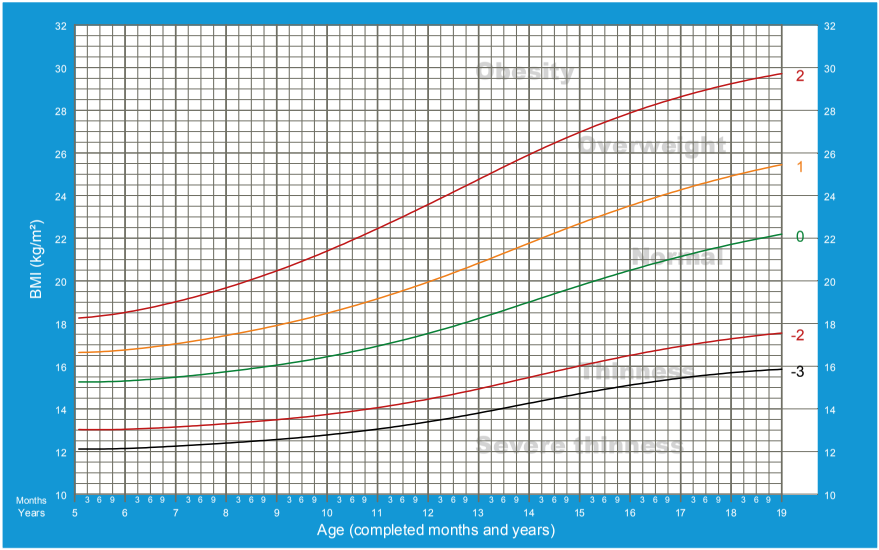
BMI-for-age BOYS

Birth to 5 years (z-scores)



BMI-for-age BOYS

5 to 19 years (z-scores)



A3.5 Calculating a child's head circumference-for-age

See p. 21 for head circumference measurement.

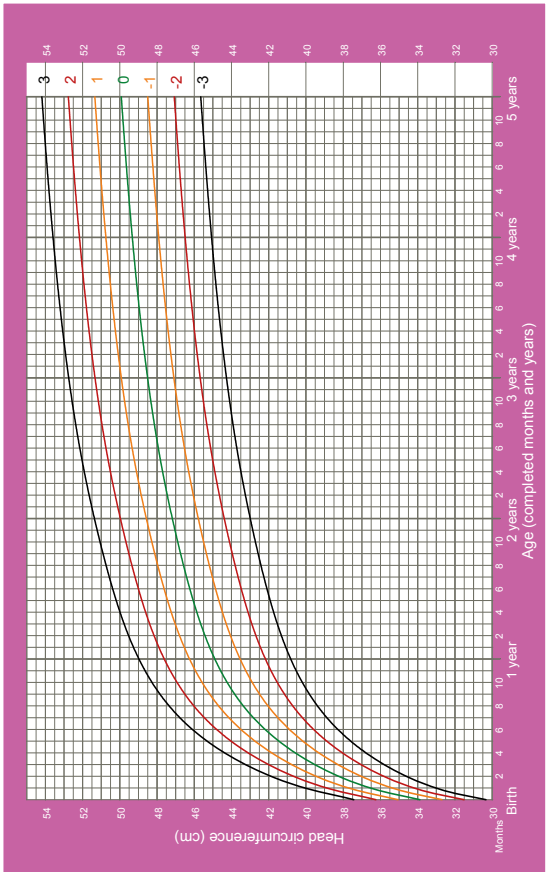
The following charts (pp. 817–818) give the WHO normalized reference head circumference for age, by sex.

Determine a child's head circumference-for-age, using the reference charts below or the reference tables online:
https://www.who.int/tools/child-growth-standards/standards.

In the chart:

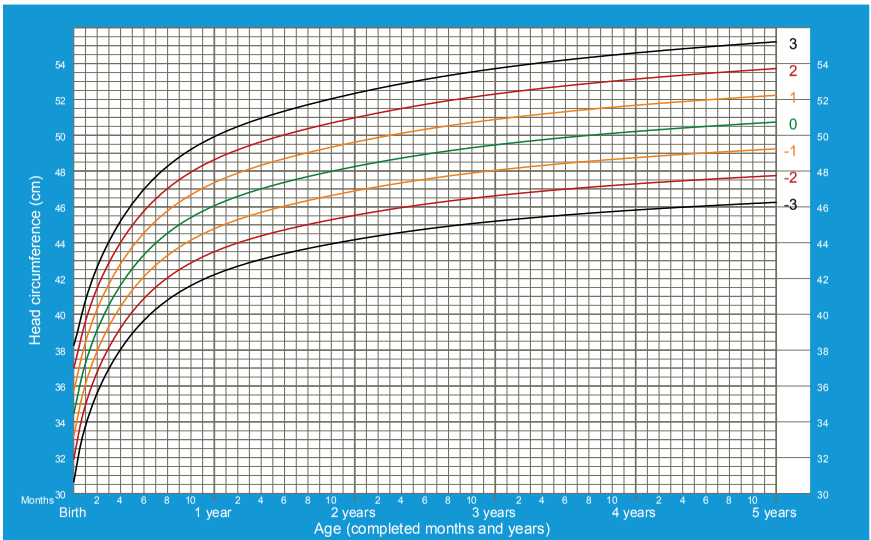
- Locate the appropriate chart for boys or girls.
- Plot head circumference-for-age:
  - Find the child's age in completed months or years on the x-axis and plot the age on a vertical line.
  - The y-axis shows the child's head circumference in cm. Find the child's head circumference on the y-axis and plot head circumference on a horizontal line.
  - Plot the child's head cirumference-for-age as a dot where the vertical and horizontal lines identified for the age and head circumference intersect.
- When points are plotted for two or more visits, connect adjacent points with a straight line to better observe trends.

Girls: head circumference-for-age



Head circumference-for-age BOYS

Birth to 5 years (z-scores)



ANNEX 4

Drug dosages

Enteral and parenteral drugs

Table 137 provides the dosage, formulation and dose according to body weight of the enteral, parenteral (**pink cells**) and nebulized or inhaled (**blue cells**) drugs commonly used in children and adolescents in the PHC setting. Each dose given by body weight should be checked against the frequency of administration in the dosage column.

This table also includes drugs that are usually prescribed and monitored by a specialist. They are included in this table as a reference for adequate follow-up in the PHC setting of children and adolescents receiving these treatments. In some cases, the dosage may vary for different indications of the same drug: these are listed separately under the drug name.

CAUTION! Doses according to body weight are calculated for the specific formulation mentioned. Some drugs are available in different formulations, and their use may differ from country to country. **Always** check the formulation of the drug you are prescribing and compare it with the formulation in this table to determine whether the stated dose according to body weight is accurate. The maximum dose listed corresponds to the maximum for an adolescent or adult.

Table 137. Enteral and parenteral drugs and dosages

Drug	Dosage	Formulation	Dose according to body weight							
			3– < 6 kg	6– < 10 kg	10– < 15 kg	15– < 20 kg	20– < 30 kg	30– < 40 kg	40– < 50 kg	Adult
Acetylsalicylic acid (aspirin)										
Kawasaki disease	3–5 mg/kg once a day (max. 300 mg/day)	Tablet 100 mg	–	¼	½	¾	1	1 ½	2	2–3
Juvenile idiopathic arthritis	20–25 mg/kg 3–4 times a day (max. 4 g/day)	Tablet 500 mg	–	–	–	1	1–1½	2	2	2
Note: *Avoid in young children, if possible, because of the risk of Reye syndrome.*										
Aciclovir	20 mg/kg 4 times a day* (max. 800 mg/dose or 3.2 g/day)	Syrup 20 mg/mL Tablet 200 mg	5 mL ½	7 mL ¾	10 mL 1	– 1	– 2	– 3	– 4	– 4
** For dosages for genital herpes, p. 691.*										
Adrenaline (see epinephrine)										
Albendazole	400 mg once a day	Tablet 400 mg	Off-label			1	1	1	1	1
Amitriptyline Depression in palliative care	9–12 years: 0.3 mg/kg (increase up to 0.5 mg/kg) 3 times a day	Tablet 10 mg Tablet 25 mg	–	–	–	½	¾	1	1	1
	Adolescents: 10 mg 3 times a day and 20 mg at bedtime (max. 200 mg/day)									

Amoxicillin	25 mg/kg twice a day (max. 1 g/day)	Syrup 250 mg/5 mL Tablet 250 mg Tablet 500 mg	2 mL ½ –	4 mL 1 ½	6 mL 1½ ¾	8 mL 2 1	– 2 1	– 2 1	– 2 1	– 2 1
Pneumonia, acute otitis media, sinusitis	30 mg/kg 3 times a day (max. 1 g/dose or 3 g/day)	Syrup 250 mg/5 mL Tablet 250 mg Tablet 500 mg	2.5 mL ½ –	5 mL 1 ½	7.5 mL 1½ ¾	10 mL 2 1	– 3 1½	– 4 2	– 4 2	– 4 2
Amoxicillin/ clavulanate	25 mg/kg amoxicillin twice a day (max. 3 g/day)	Syrup 125/31.2 mg/5 mL 250/62.5 mg/5 mL Tablet 500/125 mg	2.5 mL 1.3 mL –	4 mL 2 mL –	6 mL 3 mL –	10 mL 5 mL ½	– 7 mL ½	– 10 mL 1	– – 1	– – 1
Pneumonia,acute otitis media, complicated otitis externa	30 mg/kg amoxicillin 3 times a day (max. 3 g/day)	Syrup 100/12.5 mg/ mL Tablet 875/125 mg	1.2 mL –	2 mL –	3.5 mL –	5 mL –	7 mL –	10 mL 1	10 mL 1	10 mL 1
	50 mg/kg amoxicillin 3 times a day (max. 3 g/day)	IV: vial 1000 mg/200 mg	4 mL	8 mL	12 mL	17 mL	25 mL	35 mL	45 mL	60 mL
Ampicillin	50 mg/kg every 6 h (max. 12 g/day)	IV/IM: vial 500 mg mixed with 2.1 mL sterile water (500 mg/2.5 mL)	1 mL*	2 mL	3 mL	5 mL	5 mL	8 mL	10 mL	10 mL
**For dosages and dosage intervals in newborns and premature infants up to 4.5 kg, see p. 836.*										
Antirabies immunoglobulin	20 IU/kg: infiltrate around the wound; give any remaining dose IM	Vial: 150 IU/mL	0.7 mL	1 mL	1.5 mL	2.5 mL	3.5 mL	4.5 mL	6 mL	8 mL
Antitetanus immunoglobulin	250 IU as single dose	IM: vial: 500 IU/mL	0.5 mL							

Drug	Dosage	Formulation	Dose according to body weight							
			3–<6 kg	6–<10 kg	10–<15 kg	15–<20 kg	20–<30 kg	30–<40 kg	40–<50 kg	Adult
Antivenom immunoglobulin	Exact type to be defined locally. Consult specific product labelling for dosage and administration.									
Azithromycin	10 mg/kg once a day (max. 500 mg/day)	Syrup 200 mg/5 mL	1 mL	2 mL	3 mL	4 mL	5 mL	–	–	–
		Capsule 250 mg	–	–	–	–	1	1	2	2
		Capsule 500 mg	–	–	–	–	–	–	1	1
Epididymo-orchitis (Chlamydia)	1 g single dose	Capsule 500 mg	–	–	–	–	–	2	2	2
(Gonorrhoea)	2 g single dose	Capsule 500 mg	–	–	–	–	–	4	4	4
Betamethasone (see table for inhaled corticosteroids, p. 838. For properties and equivalent doses of systemic corticosteroids, p. 855)										
Budesonide (see table for inhaled corticosteroids, p. 838)										
Bupivacaine	Local infiltration (max. 2.5 mg/kg or 175 mg/dose). Solution 0.25% (2.5 mg/mL) and solution 0.5% (5 mg/mL) available									
Carbamazepine	Dosages according to specialist antiepileptic treatment plan. For side-effects and monitoring, p. 478.									
Cefadroxil	15 mg/kg twice a day (max. 2 g/day)	Syrup 250 mg/5 mL	1.2 mL	2.5 mL	3.7 mL	5 mL	7.5 mL	–	–	–
		Capsule 500 mg	–	–	–	–	–	1	1–2	2
Cefalexin	20 mg/kg twice a day	Syrup 125 mg/5 mL	3 mL	5 mL	10 mL	–	–	–	–	–
Tonsillitis	(max. 1 g/day)	Syrup 250 mg/5 mL	2 mL	2.5 mL	5 mL	7.5 mL	10 mL	–	–	–
		Tablet 250 mg	–	½	1	1½	2	2	2	2
Mild/moderate infections	12.5 mg/kg 4 times a day (max. 2 g/day)	Syrup 125 mg/5 mL	2 mL	4 mL	5 mL	10 mL	–	–	–	–
		Syrup 250 mg/5 mL	1 mL	2 mL	3 mL	5 mL	–	–	–	–
		Tablet 250 mg	–	½	½	1	1	1½	2	2
Severe infections (bone, joints)	25 mg/kg 4 times a day (max. 4 g/day)	Syrup 125 mg/5 mL	4 mL	7.5 mL	10 mL	–	–	–	–	–
		Syrup 250 mg/5 mL	2 mL	4 mL	6 mL	10 mL	–	–	–	–
		Tablet 250 mg	½	1	1½	2	2–3	3	4	4

Cefixime	8 mg/kg twice a day first day, then once a day (max. 400 mg/day)	Syrup 100 mg/5 mL Capsule 200 mg Capsule 400 mg	1.5 mL – –	3 mL – –	5 mL – –	7 mL – –	10 mL 1 –	– 1 –	– 2 1	– 2 1
Gonorrhoea	400 mg single dose	Capsule 400 mg	–	–	–	–	–	1	1	1
Cefotaxime	50 mg/kg every 6 h (max. 12 g/day)	IV/IM Vial 250 mg to dissolve in 1 mL	1 mL*	1.5 mL	2–3 mL	3–4 mL	4–6 mL	6–8 mL	8–10 mL	12 mL
**For dosages and dosage intervals in newborns and premature infants up to 4.5 kg, p. 836.*										
Ceftriaxone	50 mg/kg once or twice a day (max. 4 g/dose)	IV: vial 1 g mixed with 9.6 mL sterile water (1 g = 10 mL)	2 mL	4 mL	6 mL	9 mL	12 mL	1.7 mL	2 mL	30 mL
		IM: consult specific product labelling for reconstitution.	200 mg	400 mg	600 mg	900 mg	1.2 g	1.7 g	2.2 g	3 g
Epididymo-orchitis	1 g single dose		–	–	–	–	–	1 g	1 g	1 g
Cefuroxime axetil	15 mg/kg twice a day (max. 1 g/day)	Syrup 250 mg/5 mL Tablet 250 mg	1.5 mL –	2.5 mL –	3.5 mL –	5 mL 1	7.5 mL 1	– 2	– 2	– 2
Charcoal (activated)	1 g/kg single dose	Powder; mix in 8–10 volumes of water	5 g	10 g		1–12 years: 25–50 g			Adolescents: 25–100 g	
***Note:** Give the whole amount at once; if the child has difficulty in tolerating it, divide the charcoal dose.*										
Ciclesonide (see table for inhaled corticosteroids, p. 838)										

Drug	Dosage	Formulation	Dose according to body weight							
			3– < 6 kg	6– < 10 kg	10– < 15 kg	15– < 20 kg	20– < 30 kg	30– < 40 kg	40– < 50 kg	Adult
Ciprofloxacin	15 mg/kg twice a day (max. 500 mg/dose)	Syrup 250 mg/5 mL	1.2 mL	2.5 mL	3.5 mL	5 mL	7.5 mL	–	–	–
		Tablet 100 mg	½	1	1½	2	3	–	–	–
		Tablet 250 mg	¼	½	½	1	1½	2	2	2
Clarithromycin	7.5 mg/kg twice a day (max. 1 g/day)	Syrup 125 mg/5 mL	1.2 mL	2.5 mL	3.5 mL	5 mL	7.5 mL	–	–	–
		Syrup 250 mg/5 mL	0.5 mL	1.2 mL	2 mL	2.5 mL	4 mL	–	–	–
		Tablet 250 mg	–	–	–	½	½ – 1	1	1–2	2
Clonazepam	Dosages according to specialist antiepileptic treatment plan. For side effects and monitoring, p. 478.									
Cloxacillin, flucloxacillin	15 mg/kg 4 times a day (max. 4 g/day)	Syrup 125 mg/5 mL	2.5 mL	5 mL	7.5 mL	10 mL	–	–	–	–
		Capsule 250 mg	¼	½	1	1	1½	2	2–3	4
		Capsule 500 mg	–	–	–	½	½–1	1	1–1½	2
	25(–50) mg/kg every 6 h (max. 4 g/day)	IV: vial 500 mg mixed with 8 mL sterile water (500 mg/10 mL)	2 mL*	4 mL	6 mL	8 mL	12 mL	17.5 mL	20 mL	20 mL
** For dosages in newborns and premature infants up to 4.5 kg, p. 836.*										
Co-trimoxazole (trimethoprim and sulfamethoxazole)	4 mg/kg trimethoprim and 20 mg/kg sulfamethoxazole twice a day	Syrup 40/200 mg/5 mL	2 mL*	3.5 mL	6 mL	8.5 mL	–	–	–	–
		Tablet 20/100 mg	1	2	3	3–4	4–5	–	–	–
		Tablet 80/400 mg	¼	½	1	1	1	2	2	2
For pneumocystis pneumonia prophylaxis	6–8 mg/kg trimethoprim once a day (maximum 160 mg trimethoprim/dose)	Syrup 40/200 mg/5 mL	4 mL	7 mL	–	–	–	–	–	–
		Tablet 20/100 mg	1½	2–3	–	–	–	–	–	–
		Tablet 80/400 mg	–	1	1	1½	2	2	2	2
Note: **Contraindicated in newborns < 1 month.*										

Deferasirox	Consult specific product labelling for dosage and follow specialist plan (p. 613).									
Dexamethasone	0.15 mg/kg single	Syrup 2 mg/5 mL	1.5 mL	3 mL	5 mL	7 mL	10 mL	–	–	–
Mild croup	dose	Tablet 0.5 mg	1	2	4	–	–	–	–	–
	(max. 16 mg/dose)	Tablet 2 mg	–	½	1	1½	2	2½	3	4
Severe croup	0.6 mg/kg single	Syrup 2 mg/5 mL	5 mL	10 mL	–	–	–	–	–	–
	dose	Tablet 2 mg	1	2	4	5	–	–	–	–
	(max. 16 mg/dose)	Tablet 4 mg	½	1	2	2½	4	4	4	4
		IM: vial 4 mg/mL	0.6 mL	1.2 mL	1.8 mL	2.5 mL	4 mL	4 mL	4 mL	4 mL
See table for properties and equivalent doses of systemic corticosteroids, p. 855.										
Diazepam	0.2 mg/kg once or	Tablet 5 mg	–	–	½	¾	1	1–1½	2	2
Anxiety	twice a day (max. 5 mg/dose in < 5 years; 10 mg in > 5 years)	Tablet 10 mg	–	–	¼	¼–½	½	½–¾	1	1
Convulsions	Rectal: 0.5 mg/kg (max. 20 mg/dose)	Rectal tubes 2.5 mg, 5 mg, 10 mg	2.5 mg	5 mg	5 mg	10 mg	10 mg	15 mg	20 mg	20 mg
		Solution 10 mg/2 mL	0.5 mL	1 mL	1.25 mL	1.5 mL	2.5 mL	3.5 mL	4 mL	4 mL
	IV: 0.2–0.25 mg/kg (max. 10 mg/dose)	Solution 10 mg/2 mL	0.2 mL	0.4 mL	0.6 mL	0.75 mL	1.25 mL	1.75 mL	2 mL	2 mL
Diphenhydramine	1.25 mg/kg 4 times a day (max. 300 mg/day)	Syrup 12.5 mg/5 mL	–	–	5 mL	7.5 mL	–	–	–	–
		Tablet 25 mg	–	–	½	1	1–1½	1½–2	2	2
Doxycycline	2.2 mg/kg twice a day (max. 100 mg/dose)	Syrup 25 mg/5 mL	2 mL	3.5 mL	5 mL	7.5 mL	–	–	–	–
		Tablet 50 mg	–	–	1	½–1	1	1½	2	2
		Tablet 100 mg	–	–	¼	¼–½	½	¾	1	1

Drug	Dosage	Formulation	Dose according to body weight							
			3– < 6 kg	6– < 10 kg	10– < 15 kg	15– < 20 kg	20– < 30 kg	30– < 40 kg	40– < 50 kg	Adult
Epinephrine (Adrenaline)										
Severe croup	0.5 mL/kg of 1:1000 solution (max. 5 mL/dose)	Nebulized: solution 1:1000	–	3 mL	5 mL	5 mL	5 mL	5 mL	5 mL	5 mL
Anaphylaxis	≤ 6 years: 0.15 mL > 6 years: 0.3 mL	IM: solution 1:1000	0.15 mL	0.15 mL	0.15 mL	0.15 mL	0.3 mL	0.3 mL	0.3 mL	0.3 mL
Resuscitation	0.01 mg/kg (= 0.1 mL/kg every 3–5 min (max. 1 mg = 10 mL)	IV/intraosseous: solution 1:10 000	0.5 mL	0.7–1 mL	1–1.5 mL	1.5–2 mL	2–3 mL	3–4 mL	4–5 mL	5–10 mL
Note: *make up a 1:10 000 solution by adding 1 mL of 1:1000 solution to 9 mL of normal saline or 5% glucose*										
Erythromycin	12.5 mg/kg 4 times a day (max. 4 g/day)	Tablet 250 mg	¼	½	1	1	1½	2	2	3
Estrogen-progestogen (see table for emergency contraception, p. 685)										
Ethambutol (see table for TB treatment, p. 852)										
Ethosuximide	Dosages according to the specialist antiepileptic treatment plan. For side-effects and monitoring, p. 478.									
Famciclovir	250 mg 2 or 3 times a day	Tablet 250 mg	–	–	–	–	–	–	1	1
Flucloxacillin (see Cloxacillin)										

Fluconazole	3 mg/kg once a day (6 mg/kg first day) (max. 600 mg/day)	Syrup 50 mg/5 mL Capsule 50 mg	– –	2.5 mL –	3.5 mL –	5 mL 1	7.5 mL 1½	– 2	– 2–2½	– 3–4
Fluoxetine	Start with 5 or 10 mg once a day. After several weeks, increase up to 20 mg once a day if required.	Tablet 20 mg	–	–	–	See dosage				
Fluticasone (see table for inhaled corticosteroids, p. 838)										
Formoterol + inhaled corticosteroid (see table for inhaled corticosteroids + long-acting beta2-agonists, p. 839)										
Gabapentin	Dosages according to specialist antiepileptic treatment plan. For side-effects and monitoring, p. 478.									
Glucose Hypoglycaemia	3 ml/kg 10% glucose solution rapidly IV, see p. 728.									
Griseofulvin	10–20 mg/kg once a day or divided in 2 doses (max. 1 g/day)	Syrup 125 mg/5 mL Tablet 125 mg Tablet 500 mg	– – –	5 mL 1 ¼	7.5 mL 1½ ¼–½	10 mL 2 ½	– 3 ¾	– 4 1	– 5 1–2	– 6–8 1–2
Haloperidol	0.5–2 mg orally, IV or SC every 6 h. The dosage can be titrated, if necessary, up to 10–15 mg daily.									
Hydroxyurea	Start at 15 mg/kg once a day, increase based on monitoring; follow specialist advice (max. 35 mg/kg/day)	Tablet 500 mg	–	–	See dosage					
Ibuprofen	5–10 mg/kg every 6–8h (max. 40 mg/kg/day or 2400 mg/day)	Syrup 200 mg/5 mL Tablet 200 mg Tablet 400 mg	– – –	1.5 mL ¼ –	2.5 mL ½ ¼	3 mL ½ ¼	5 mL ¾ ½	7 mL 1 ½	– 2 1	– 2 1
Note: *not advised for children < 3 months.*										
Insulin (p. 605)										

Drug	Dosage	Formulation	Dose according to body weight							
			3– < 6 kg	6– < 10 kg	10– < 15 kg	15– < 20 kg	20– < 30 kg	30– < 40 kg	40– < 50 kg	Adult
Ipratropium bromide Severe asthma exacerbation	160 µg	Metered dose inhaler: 20 µg/dose	8 puffs							
	< 30 kg: 250 µg ≥ 30 kg: 500 µg	Solution for nebulizer: 250 µg/mL	1 mL	1 mL	1 mL	1 mL	1 mL	2 mL	2 mL	2 mL
Iron Treatment of iron deficiency	2–3 mg/kg twice a day (max. 200 mg/day)	Iron syrup (iron fumarate 100 mg/ 5 mL)	0.5 mL	1 mL	1.5 mL	2.5 mL	3 mL	–	–	–
		Iron folate tablet (iron sulfate 200 mg + 250 mg folate)	–	–	½	¾	1	1	1	1
Isoniazid (see table for TB treatment, p. 852)										
Ivermectin Scabies	200 mg/kg repeated once after 10 days	Tablet 3 mg	–	–	–	1	2	2½	3	4–5
Ketamine Sedation, severe pain (trauma, burns)	Calculate **exact** dose based on the child's body weight or use the doses below only when this is not possible.									
	Nasal: 4 mg/kg, half in each nostril (max. 50 mg = 1 mL per nostril)	Use IV form	–	30 mg	50 mg	70 mg	100 mg	100 mg	100 mg	100 mg
	Loading dose: 1 mg/kg	IV vial 50 mg/mL	–	8 mg	12 mg	15 mg	25 mg	35 mg	45 mg	60 mg
	Further dose (if required): 0.5 mg/kg (max. 100 mg/dose)		–	4 mg	6 mg	8 mg	12 mg	17 mg	25 mg	30 mg
Note: *not advised for children < 3 months.*										

Lactulose	1–2 g/kg/day, divided in 1–3 doses (max. 30 g/dose; 40 g/day)	Oral solution 10 g/15 mL	5 mL/day		5–10 mL/day		10–20 mL/day		15–30 mL/day	
Lamotrigine	Dosages according to specialist antiepileptic treatment plan. For side-effects and monitoring, p. 478.									
Levetiracetam	Calculate **exact** dose based on the child's body weight or use the dosages below (calculated for 50 mg/kg/dose)									
Status epilepticus	40–60 mg/kg (max. 4.5 g/dose)	IV vial 500 mg/5 mL	–	400 mg	600 mg	850 mg	1.25 g	1.5–2 g	2–2.5 g	3 g
Antiepileptic maintenance treatment: dosages according to specialist antiepileptic treatment plan. For side effects and monitoring, p. 478.										
Levofloxacin	500 mg/day once a day	Tablet 250 mg	–	–	–	–	–	–	2	2
Epididymo-orchitis		Tablet 500 mg							1	1
Levonorgestrel (see table for emergency contraception, p. 685)										
Lidocaine	Local infiltration; max. 3 mg/kg/dose or 200 mg/dose, not repeated within 2 h. Solution 1% (10 mg/mL) and solution 2% (20 mg/mL) available.									
Loratadine	≤ 30 kg: 5 mg once a day	Syrup 1 mg/mL	–	–	5 mL	5 mL	5 mL	10 mL	10 mL	10 mL
	> 30 kg: 10 mg once a day	Tablet 10 mg	–	–	–	–	–	1	1	1
Note: *not advised for children < 2 years.*										
Lorazepam	0.1 mg/kg (max. 4 mg/dose)	IV: vial 2 mg/mL	–	0.8 mg (0.4 mL)	1.2 mg (0.6 mL)	1.8 mg (0.9 mL)	2.5 mg (1.2 mL)	3.5 mg (1.7 mL)	4 mg (2 mL)	4 mg (2 mL)
Convulsions										
Mebendazole	3-day regimen: Tablet 100 mg twice a day		–	–	1	1	1	1	1	1
	Single-dose regimen: Tablet 500 mg		–	–	1	1	1	1	1	1
Note: *not advised for children < 5 months owing to limited information.*										

Drug	Dosage	Formulation	Dose according to body weight							
			3– < 6 kg	6– < 10 kg	10– < 15 kg	15– < 20 kg	20– < 30 kg	30– < 40 kg	40– < 50 kg	Adult
Melatonin Sleeping problems in palliative care	Start with 1–2 mg (≤ 5 years) or 2–5 mg (> 5 years) at night	Prolonged-release tablet 2 mg	½–1	½–1	½–1	½–1	1–2	1–2	1–2	1–2
Methylprednisolone	2 mg/kg once a day (max. 60 mg/day)	IM: 40 mg/mL IM: 80 mg/mL	0.2 mL 0.1 mL	0.4 mL 0.2 mL	0.6 mL 0.3 mL	0.8 mL 0.4 mL	1.2 mL 0.6 mL	1.5 mL 0.75 mL	1.5 mL 0.75 mL	1.5 mL 0.75 mL
See table for properties and equivalence doses of systemic corticosteroids, p. 855.										
Metronidazole	7.5 mg/kg 3 times a day (max. 250 mg/dose)	Tablet 250 mg Tablet 500 mg	– –	¼ –	½ ¼	½ ¼	¾ ½	1 ½	1 ½	1 ½
Giardiasis and amoebiasis	10 mg/kg 3 times a day (max. 500 mg/dose)	Tablet 250 mg Tablet 500 mg	– –	¼ –	½ ¼	½ ¼	1 ½	1 ½ ¾	2 1	2 1
Midazolam Convulsions	0.2 mg/kg (max. 10 mg/dose)	Intranasal, buccal 5 mg/mL	–	1.5 mg (0.3 mL)	2.5 mg (0.5 mL)	3.5 mg (0.7 mL)	5 mg (1 mL)	7 mg (1.5 mL)	9 mg (1.2 mL)	10 mg (2 mL)
	0.2 mg/kg (max. 10 mg/dose)	IM: 1 mg/mL	–	1.5 mg (1.5 mL)	2.5 mg (2.5 mL)	3.5 mg (3.5 mL)	5 mg (5 mL)	7 mg (7 mL)	9 mg (9 mL)	10 mg (10 mL)
	0.15 mg/kg (max. 7.5 mg/dose)	IV: 1 mg/mL	–	1.2 mg (1.2 mL)	1.8 mg (1.8 mL)	2.5 mg (2.5 mL)	4 mg (4 mL)	5 mg (5 mL)	7 mg (7 mL)	7.5 mg (7.5 mL)
Sedation, severe pain (trauma, burns)	0.2 mg/kg (max. 10 mg/dose)	Intranasal, buccal 5 mg/mL	–	1.5 mg (0.3 mL)	2.5 mg (0.5 mL)	3.5 mg (0.7 mL)	5 mg (1 mL)	7 mg (1.5 mL)	9 mg (1.2 mL)	10 mg (2 mL)
	0.1 mg/kg (max. 7.5 mg/dose)	IV: 1 mg/mL	–	0.8 mg (0.8 mL)	1.2 mg (1.2 mL)	1.7 mg (1.7 mL)	2.5 mg (2.5 mL)	3.5 mg (3.5 mL)	4.5 mg (4.5 mL)	6 mg (6 mL)

Mifepristone (see table for medical abortion, p. 698)										
Misoprostol (see table for medical abortion, p. 698)										
Mometasone (see table for inhaled corticosteroids, p. 838)										
Morphine	Calculate **exact** dose based on the child's body weight. Oral: first dose 0.4 mg/kg (max. 20 mg/dose), then 0.2 mg/kg every 4–6 h; increase if necessary for severe pain.									
	IM: first dose 0.2 mg/kg, then 0.1 mg/kg every 4–6 h (max. 15 mg/day) IV: first dose 0.1 mg/kg, then 0.05 mg/kg every 4–6 h (max. 15 mg/day)									
Naloxone	10 µg/kg repeat every 5 minutes if required (max. 400 µg/dose)	IV/IM vial: 400 µg/1 mL	0.1 mL	0.2 mL	0.3 mL	0.4 mL	0.6 mL	0.9 mL	1 mL	1 mL
Nitrofurantoin	1.5 mg/kg 4 times a day (max. 400 mg/day)	Syrup 25 mg/5 mL Tablet 100 mg	1.2 mL –	2.5 mL –	3.5 mL –	5 mL ¼	7.5 mL ½	10 mL ½	– ¾	– ¾–1
Ofloxacin Epididymo-orchitis	300 mg twice a day	Tablet 300 mg	–	–	–	–	–	–	1	1
Omeprazole	1 mg/kg up to 40 mg once a day	Tablet 10 mg Capsule 20 mg	½ –	½ –	1 –	1 –	2 1	2 1	– 1–2	– 1–2
Ondansetron Persistent vomiting	0.15 mg/kg single dose (max. 8 mg/dose)	Syrup 4 mg/5 mL Tablet 4 mg	– –	– –	2.5 mL ½	5 mL 1	5 mL 1	– 2	– 2	– 2
		IV: 2 mg/mL	–	–	1 mL	1.5 mL	2 mL	2.5 mL	3 mL	4 mL
Note: *not advised for children < 6 months.*										
Oxcarbazepine	Dosages according to specialist antiepileptic treatment plan. For side-effects and monitoring, p. 478.									

Drug	Dosage	Formulation	Dose according to body weight							
			3– < 6 kg	6– < 10 kg	10– < 15 kg	15– < 20 kg	20– < 30 kg	30– < 40 kg	40– < 50 kg	Adult
Paracetamol (acetaminophen)	10–15 mg/kg every 4–6 h (max. 60 mg/kg/day or 4 g/day)	Syrup 120 mg/5 mL	1.5 mL	3.5 mL	5 mL	7.5 mL	10 mL	–	–	–
		Tablet 100 mg	–	1	1	2	3	4	–	–
		Tablet 500 mg	–	–	¼	½	½	1	1	1
		Suppository 100 mg	–	1	1	1	–	–	–	–
Paraffin oil	Once (at night) or twice a day	Oral liquid	–	–	–	5 mL	5 mL	7.5 mL	7.5 mL	7.5 mL
		Emulsion 475 mg/mL	–	–	–	10 mL	10 mL	15 mL	15 mL	15 mL
Note: *DO NOT give paraffin oil to children < 6 years and children at risk of aspiration.*										
PENICILLIN										
Benzathine benzylpenicillin (Benzathine penicillin G)	< 30 kg: 600 000 U; > 30 kg: 1 200 000 U, single dose	IM: vial of 1 200 000 U mixed with 4 mL sterile water	2 mL	2 mL	2 mL	2 mL	2 mL	4 mL	4 mL	4 mL
Note: *for IM injection only; DO NOT administer by IV injection.*										
Phenoxymethylpenicillin (Penicillin V)	25 mg/kg twice a day (max. 3 g/day)	Syrup 250 mg/5 mL	2.5 mL	2.5 mL	5 mL	5 mL	10 mL	–	–	–
		Tablet 250 mg	–	–	1	1	2	2	4	4
Phenobarbital	Antiepileptic maintenance treatment: dosages according to specialist antiepileptic treatment plan. For side-effects and monitoring, p. 478.									
Convulsions	15–20 mg/kg (max. 1 g/dose)	IV: 200 mg/mL	0.4 mL*	0.6 mL	1.0 mL	1.5 mL	2 mL	3.0 mL	4 mL	5 mL
**For dosages and dosage intervals in newborns up to 4.5 kg, see p. 837.*										

Phenytoin	Antiepileptic maintenance treatment: dosages according to specialist antiepileptic treatment plan. For side-effects and monitoring, p. 478.									
Status epilepticus	20 mg/kg (max. 1.5 g/dose)	IV: 250 mg/5 mL	–	3 mL	5 mL	7 mL	10 mL	14 mL	18 mL	25 mL
Polyethylene glycol Constipation	0.2–0.8 g/kg once a day (max. 17 g/day)	Syrup 500 mg/mL	–	5–8 mL	10 mL	–	–	–	–	–
		Oral preparation 4 g	–	½	1	2	2	3	3–4	3–4
		Oral preparation 10 g	–	–	–	½	1	1–1½	1–2	1–2
Disimpaction	0.5–0.75 g/kg twice a day (max. 17 g/day)	Syrup 500 mg/mL	–	20 mL	–	–	–	–	–	–
		Oral preparation 4 g	–	2	3	4	–	–	–	–
		Oral preparation 10 g	–	1	1½	2	–	–	–	–
Note: *not advised for children < 6 months.*										
Prednisolone	1 mg/kg twice a day	Syrup 5 mg/mL	0.8 mL	1.6 mL	2.5 mL	3.5 mL	5 mL	–	–	–
		Tablet 5 mg	1	1–2	2	3	5	–	–	–
		Tablet 25 mg	–	–	½	½	1	1–1½	1½–2	2
See table for properties and equivalence doses of systemic corticosteroids, p. 855.										
Progesterone (see table for contraception, p. 682)										
Promethazine For motion or travel sickness	0.5 mg/kg the night before or 1–2 h before travel	Tablet 10 mg	–	–	½	1	1	1½	–	–
		Tablet 25 mg	–	–	–	–	½	¾	1	1
Propranolol Prevention of migraine	0.3 mg/kg 3 times a day	Tablet 20 mg	–	–	–	¼	½	½	¾	1
	Increase up to 0.5 mg/kg 3 times a day if required (max. 4 mg/kg/day)									
Pyrazinamide (see table for TB treatment, p. 852)										
Rifampicin (see table for TB treatment, p. 852)										

Drug	Dosage	Formulation	Dose according to body weight							
			3– < 6 kg	6– < 10 kg	10– < 15 kg	15– < 20 kg	20– < 30 kg	30– < 40 kg	40– < 50 kg	Adult
Salbutamol	2–10 puffs according to age and severity (p. 591)	Metered dose inhaler: 100 µg/dose	See dosage							
	< 20 kg: 2.5 mg ≥ 20 kg: 5 mg	Solution for nebulizer: 5 mg/mL	0.5 mL	0.5 mL	0.5 mL	0.5 mL	1 mL	1 mL	1 mL	1 mL
Salmeterol + inhaled corticosteroid (see table for inhaled corticosteroids + long-acting beta2-agonists, p. 839)										
Senna	Once a day	Syrup 7.5 mg/5 mL	–	–	3 mL	3 mL	5 mL	10 mL	10 mL	10 mL
Sorbitol	2 mL/kg once a day (max. 60 mL/dose)	Oral solution 70%	–	–	25 mL	35 mL	50 mL	60 mL	60 mL	60 mL
Streptomycin (see table for TB treatment, p. 852)										
Tetracycline										
Severe acne	500 mg twice a day	Tablet 500 mg	–	–	–	–	–	1	1	1
STIs with chlamydia	500 mg 4 times a day		–	–	–	–	–	1	1	1
Tinidazole	50 mg/kg once a day (max. 2 g/day)	Tablet 500 mg	½	1	1	1½	2–3	3–4	4	4
Topiramate	Dosages according to specialist antiepileptic treatment plan. For side-effects and monitoring, p. 478.									
Ulipristal acetate (see table for emergency contraception, p. 685)										

Valaciclovir Genital herpes	500 mg twice a day	Tablet 500 mg	–	–	–	–	–	1	1	1
Valproic acid	Antiepileptic maintenance treatment: dosages according to specialist antiepileptic treatment plan. For side-effects and monitoring, p. 478.									
Status epilepticus	40 mg/kg (max. 3 g/day)	IV: 100 mg/mL	1.5 mL	3 mL	5 mL	7 mL	10 mL	14 mL	18 mL	25 mL
Vigabatrin	Dosages according to the specialist antiepileptic treatment plan. For side-effects and monitoring, p. 478.									
Vitamin A Measles	Once a day for 2 days	Capsule 50 000 IU Capsule 100 000 IU Capsule 200 000 IU	1 ½ –	2 1 ½	4 2 1	4 2 1	4 2 1	4 2 1	4 2 1	4 2 1
Vitamin D (Cholecalciferol) See p. 97 (prophylaxis) or p. 427 (treatment rickets)										
Vitamin K (Phytomenadione) See p. 837										
Zinc sulphate	20 mg once a day	Tablet 20 mg	–	1	1	1	1	1	1	1

IM: intramuscular; IU: international units; IV: intravenous; SC: subcutaneous
For IM injection, if volume exceeds the maximum allowed, split over multiple sites.
For intranasal drugs, give half dose in each nostril.

Common enteral and parenteral drugs for newborns

These drugs require specific dosages. All other drugs that do not require specific dosages are found in Table 137 (p. 820).

Table 138. Enteral and parenteral drugs for newborns

Drug	Dosage	Form	Dose according to body weight				
			2–< 2.5 kg	2.5–< 3 kg	3–< 3.5 kg	3.5–< 4 kg	4–< 4.5 kg
Ampicillin	50 mg/kg **First week of life:** every 12 h **Weeks 2–4 of life:** every 8 h	IV/IM: vial 250 mg mixed with 2.3 mL sterile water to (250 mg/2.5 mL)	1–1.2 mL	1.2–1.5 mL	1.5–1.7 mL	1.7–2 mL	2–2.2 mL
Benzyl-penicillin (Penicillin G)	50 000 U/kg/dose **First week of life:** every 12 h **Weeks 2–4 of life:** every 8 h	IV/IM: vial 600 mg (1 000 000 U) mixed with 1.6 mL sterile water (500 000 U/mL)	0.25 mL	0.3 mL	0.35 mL	0.4 mL	0.45 mL
Cefotaxime	50 mg/kg **First week of life:** every 12 h **Weeks 2–4 of life:** every 8 h	IV/IM: vial 250 mg to dissolve in 1 mL	0.5 mL	0.6 mL	0.7 mL	0.8 mL	0.9 mL
Cloxacillin	25(–50) mg/kg **First week of life:** every 12 h **Weeks 2–4 of life:** every 8 h	IV/IM: vial 250 mg mixed with 1.3 mL sterile water (250 mg/1.5 mL)	0.3 mL	0.4 mL	0.5 mL	0.5–0.6 mL	0.6 mL

Phenobarbital	IV: Loading dose: 20 mg/kg. If convulsions persist, give further doses of phenobarbital 10 mg/kg up to maximum of 40 mg/kg.	IM/IV: vial 200 mg/mL diluted with 4 mL sterile water	Calculate the **exact** dose based on the child's body weight.				
	Maintenance dose: 5 mg/kg	Tablet 30 mg	½	½	½	¾	¾
Vitamin K (Phytomenadione)	3 doses of 2 mg orally at birth, at 4 to 6 days, and at 4 to 6 weeks	Vial 1 mg/0.5 mL or 1 mg/mL to be used orally	–	–	–	–	–
	1 mg after birth Preterm newborn: 0.4 mg/kg	IM: vial 1 mg/0.5 mL or 1 mg/mL	–	–	–	–	–

Inhaled drugs for asthma

Table 139. Low, medium and high daily doses (µg) of inhaled corticosteroids

Inhaled corticosteroids (ICS)	Total daily dose (µg) according to age						
	≤ 5 years[a]	6–11 years			≥ 12 years		
		Low	Medium	High	Low	Medium	High
Betamethasone dipropionate (pMDI,[b] HFA)	100	100–200	> 200–400	> 400	200–500	> 500–1000	> 1000
Betamethasone dipropionate (pMDI, extrafine particle, HFA)	50	50–100	> 100–200	> 200	100–200	> 200–400	> 400
Budesonide (DPI)	–	100–200	> 200–400	> 400	200–400	> 400–800	> 800
Budesonide (NEB)	500	250–500	> 500–1000	> 1000	–	–	–
Ciclesonide (pMDI, extrafine particle, HFA)	–	80	> 80–160	> 160	80–160	> 160–320	> 320
Fluticasone furoate (DPI)	–	50	50	–	100	100	200
Fluticasone propionate (DPI)	–	50–100	> 100–200	> 200	100–250	> 250–500	> 500
Fluticasone propionate (pMDI,[b] HFA)	50	50–100	> 100–200	> 200	100–250	> 250–500	> 500
Mometasone furoate (DPI)	–	–	–	–	Depends on DPI device		
Mometasone furoate (pMDI,[b] HFA)	100	100	100	200	200–400		> 400

DPI: dry powder inhaler; HFA: hydrofluoroalkane propellant; NA: not applicable; NEB: nebulizer; NSS: not sufficiently studied in children ≤ 5 years; pMDI: pressurized metered dose inhaler

[a] The doses listed in this table for children ≤ 5 years are the lowest approved doses for which safety and effectiveness have been adequately studied in this age group.

[b] Standard (non-fine) particle.

Table 140. Combinations of inhaled corticosteroids + long-acting beta2-agonists[a]

Inhaled corticosteroids (ICS) + long-acting beta2-agonist (LABA)	Maximum dose (µg)
Beclometasone + formoterol	Maximum 48 µg formoterol per day
Budesonide + formoterol	Maximum 72 µg formoterol per day
Fluticasone propionate + formoterol	Consult specific product labelling
Fluticasone propionate + salmeterol	Maximum 50 µg salmeterol twice a day

[a] This table shows the currently approved combinations of inhaled corticosteroids (ICS) with long-acting beta2-agonists (LABA) for controller treatment of asthma. The dose given should be based on the ICS (see p. 838) according to severity (p. 594) and the maximum permitted LABA dose. Different concentrations exist for each combination, check the product label to identify which are available in your setting.

Topical drugs for the skin, eyes, mouth, nose and ears

Table 141. Topical drugs for the skin

Drug	Form	Frequency and other instructions[1]
Anaesthetics		
Lidocaine	Cream, gel 2% to 4%	2–3 times daily as needed (max 4.5 mg/kg/dose)
Lidocaine, prilocaine	Cream 5%, patch	Apply to intact skin, depending on age and skin area Use with caution in young infants due to potential systemic absorption (apply no longer than 20 minutes)
Lidocaine, epinephrine, tetracaine (LET)	Gel or solution: L4% – E0.1% – T0.5%	Apply 1–3 mL directly to the wound and wound edges Use with caution in young infants due to potential systemic absorption (apply no longer than 20 minutes)
Analgesics		
Fentanyl	Transdermal patch	For moderate or severe cancer pain or pain at the end of life in patients who are unable to take oral medicines or who have renal failure
Antifungal		
Miconazole	Cream, ointment 2%	Twice daily
Nystatin	Cream, ointment	2–4 times daily (≥ 1 month)
Terbinafine	Cream, ointment 1%	Once daily (≥ 12 years, owing to limited data in children)

Anti-infectives		
Clindamycin	Gel, lotion 1% Cream 2%	Acne: twice daily (≥ 12 years, owing to limited data in children) Bacterial vaginosis: intravaginal, at bedtime
Erythromycin	Gel, lotion, ointment 2%	Acne: twice daily (≥ 12 years)
Fusidic acid	Cream, ointment 2%	2–3 times daily
Metronidazole	Gel 0.75%	Bacterial vaginosis: intravaginal, once daily
Mupirocin	Cream, ointment 2%	3 times daily (≥ 1 month)
Silver sulfadiazine	Cream 1%	Once daily (> 2 months)
Antipruritic		
Calamine	Lotion	3–4 times daily (≥ 6 months)
Antiseptics		
Chlorhexidine	Solution 5%, gel 4%	1–3 times daily, or prior to procedure
Povidone iodine	Solution 10%	1–3 times daily, or prior to procedure (> 1 month)
Cauterization		
Silver nitrate	Pencil tip	Umbilical granuloma: apply directly to the granulation tissue up to 3 times a day for 3 days

Drug	Form	Frequency and other instructions[1]
Corticosteroids (Note: when long-term treatment is required, consider gradual reduction of potency and frequency of application (every 2 weeks) to avoid rebound flare-ups)		
Hydrocortisone (low potency)	Cream, ointment 1%	1–3 times daily, avoid use > 3 weeks
Betamethasone valerate (moderate/high potency)	Cream, ointment 0.1%	1–3 times daily (1–2 times usually enough) (≥ 1 year), avoid use > 3 weeks
Betamethasone dipropionate (high potency)	Cream 0.05%	1–2 times daily (≥ 1 year), avoid use > 3 weeks
Mometasone furoate (high potency)	Cream, ointment 0.1%	Once daily (≥ 2 years), avoid use > 3 weeks
Medicines affecting skin differentiation and proliferation		
Benzoyl peroxide	Cream, lotion 2.5–5%	Acne: start once daily, increase to 2–3 times daily if required (≥ 7 years)
Retinoid (e.g. adapalene)	Cream 0.1%	Acne: consult specific product labelling
Podophyllin	Solution 10 to 25%	Warts: consult specific product labelling
Salicylic acid	Solution 5%	Warts: apply daily (≥ 2 years)
Pediculicides (treatment for lice)		
Dimethicone	Lotion 1%, liquid 2%, cream 1.3–5%	Consult specific product labelling
Malathion	Lotion 0.5%	Apply on the head, consult specific product labelling for amount and duration before rinsing (≥ 2 years)
Permethrin	Cream 5%, lotion 1%	For entire body from neck to toes (≥ 2 months)

Scabicides (treatment for scabies)		
Benzyl benzoate	Lotion 25%	For entire body from neck to toes (≥ 2 years of age)
Crotamiton	Cream 10%	For entire body from neck to toes (≥ 1 month)
Malathion in aqueous base	Lotion 0.5%	For entire body from neck to toes (≥ 2 years of age)
Permethrin	Cream 5%, lotion 1%	For entire body from neck to toes (≥ 2 months)
Sulfur	Ointment 5%, 10%	For entire body from neck to toes
Skin barrier or moisture		
Petroleum jelly (Petrolatum)	–	For nappy rash: apply at every nappy change
Zinc paste	–	For nappy rash: apply at every nappy change

[1] The duration of treatment depends on the indication and effects in the patient.

Table 142. Topical drugs for the eyes

Drug	Form	Frequency and other instructions
Antihistamines		
Azelastine	Eye drops 0.05%	1 drop twice daily into affected eye(s) (≥ 3 years)
Ketotifen	Eye drops 0.025%	1 drop twice daily into affected eye(s) (≥ 3 years)
Olopatadine	Eye drops 0.1%	1 drop twice daily into affected eye(s) (≥ 2 years)
Anti-infectives		
Azithromycin	Eye drops 1.5%	1 drop twice daily into affected eye(s) (≥ 1 year)
Erythromycin	Eye ointment 0.5%	2–6 times daily into affected eye(s) (≥ 1 month)
Gentamicin	Eye drops 0.3%	1–2 drops 6–12 times daily into affected eye(s) (≥ 1 month)
Ofloxacin	Eye drops 0.3%	1–2 drops 6–12 times daily into affected eye(s) (≥ 1 year)
Tetracycline	Eye ointment 1%	2–3 times daily into affected eye(s)

Table 143. Topical drugs for the mouth

Drug	Dosage	Form	Frequency and other instructions
Lidocaine	–	Oral gel 2% Spray 10%	Painful oral ulcers: apply on a gauze pad or spray to painful mouth ulcers before feeds
Miconazole	For < 2 years: 25 mg (1.25 mL) 4 times a day For > 2 years: 50 mg (2.5 mL) 4 times a day	Oral gel 20 mg/mL	Oral thrush: do not apply gel to the back of the throat (possible choking). The gel should not be swallowed immediately but kept in the mouth as long as possible. Apply until 2 days after the lesions disappear.
Nystatin	100 000–200 000 U (1–2 mL) into the mouth	Oral suspension 100 000 units/mL	Oral thrush: give 4 times daily until 2 days after the lesions disappear.

Table 144. Topical drugs for the nose

Drug	Form	Frequency and other instructions
Budesonide	Nasal spray: 64 or 100 µg per dose	1–2 times daily per nostril (≥ 6 years)
Fluticasone furoate	Nasal spray 27.5 µg per dose	1–2 times daily per nostril (≥ 2 years)
Mometasone	Nasal spray 50 µg per dose	1–2 times daily per nostril (≥ 6 years)
Oxymetazoline	Nasal spray, drops 0.01%, 0.025%	1–3 times daily per nostril (≥ 1 month) for max. 5 days
Xylometazoline	Nasal spray, drops 0.05%	Nasal bleed in palliative care: 1–3 times daily per nostril (≥ 3 months) for max. 5 days

Table 145. Topical drugs for the ear

Drug	Form	Frequency and other instructions
Acetic acid	Solution, 2% in alcohol	Insert saturated cotton wick (≥ 3 years)
Ciprofloxacin	Ear drops 0.3%	Twice daily into affected ear(s) (≥ 6 months)
Ciprofloxacin + dexamethasone	Ear drops 0.3% + 0.1%	Twice daily into affected ear(s) (≥ 6 months)
Ciprofloxacin + hydrocortisone	Ear drops 0.2% + 1%	Twice daily into affected ear(s) (≥ 1 year)

Antiretrovirals

Table 146. Antiretroviral dosages for infants < 4 weeks of age

Drug	Dosage	Form	Dose according to body weight		
			2–< 3 kg	3–< 4 kg	4–< 5 kg
Lopinavir/ritonavir (LPV/RTV)[a]	Twice a day	Liquid: (LPV 80 mg + RTV 20 mg)/mL	0.6 mL	0.8 mL	1 mL
Lamivudine (3TC)	Twice a day	Liquid: 10 mg/mL	0.5 mL	0.8 mL	1 mL
Zidovudine (AZT)		Liquid: 10 mg/mL	1 mL	1.5 mL	2 mL
Nevirapine (NVP)	Twice a day	Liquid: 10 mg/mL	1.5 mL	2 mL	3 mL
Raltegravir (RAL)		10 mg/mL			
< 1 week	Once a day	Oral granules for suspension (100 mg/sachet)	0.4 mL	0.5 mL	0.7 mL
> 1 week	Twice a day		0.8 mL	1 mL	1.5 mL

[a] Do not use in infants < 2 weeks of age.

Table 147. Antiretroviral dosages for infants and children ≥ 4 weeks of age

Drug	Dosage	Form	Dose according to body weight (Note: the weight categories differ from the other drug tables)						
			3–< 6 kg	6–< 10 kg	10–< 14 kg	14–< 20 kg	20–< 25 kg	25–< 35 kg	Adolescents
Fixed-dose combinations									
Zidovudine/ lamivudine (AZT/3TC)	Twice a day	Tablet AZT 60 mg + 3TC 30 mg	1	1.½	2	2½	3	–	–
		Tablet AZT 300 mg + 3TC 150 mg	–	–	–	–	–	1	–
Zidovudine/ lamivudine /nevirapine (AZT/3TC/NVP)[a]	Twice a day	Tablet: AZT 60 mg + 3TC 30 mg + NVP 50 mg	1	1.5	2	2½	3		–
		Tablet: AZT 300 mg + 3TC 150 mg + NVP 200 mg	–	–	–	–	–	1	–
Abacavir/ lamivudine (ABC/3TC)	Twice a day (once a day)	Tablet: d4T 60 mg + 3TC 30 mg	1 (2)	1½ (3)	2 (4)	2½ (5)	3 (6)	–	–
		Tablet: d4T 120 mg + 3TC 60 mg	½ (1)	½ AM 1 PM (1½)	1 (2)	1 AM 1½ PM (2½)	1½ (3)	–	–
		Tablet: d4T 600 mg + 3TC 300 mg	–	–	–	–	–	½ (1)	–
Nucleoside reverse transcriptase inhibitors (NRTIs)									
Abacavir (ABC)	Twice a day	Liquid: 20 mg/mL	3 mL	4 mL	6 mL	–	–	–	–
		Tablet: 60 mg	1	1½	2	2½	3	–	–
		Tablet: 300 mg	–	–	–	–	–	1	2
		Tablet: 600 mg	–	–	–	–	–	–	1
Lamivudine (3TC)	Twice a day	Liquid: 10 mg/mL	3 mL	4 mL	6 mL	–	–	–	–
		Tablet: 150 mg	–	–	–	–	–	–	2
		Tablet: 300 mg	–	–	–	–	–	–	1

Zidovudine (AZT)	Twice a day	Liquid: 10 mg/mL	6 mL	9 mL	12 mL	–	–	–	–
		Tablet: 60 mg	1	1½	2	2½	3	–	–
		Tablet: 300 mg	–	–	–	–	–	1	2
Emtricitabine (FTC)	Once a day	Tablet: 200 mg	–	–	–	–	–	–	1
Nucleotide reverse transcriptase inhibitors (NtRTIs)									
Tenofovir disoproxil fumarate (TDF)	Once a day	Tablet: 300 mg	–	–	–	–	–	–	1
Non-nucleoside reverse transcriptase inhibitors (NNRTIs)									
Efavirenz[b] (EFV)	Once a day	Tablet: 200 mg	–	–	1	1½	1½	2	–
		Tablet: 400 mg	–	–	–	–	–	–	1
		Tablet: 600 mg	–	–	–	–	–	–	1
Nevirapine (NVP)	Twice a day	Liquid: 10 mg/mL	5 mL	8 mL	10 mL	–	–	–	–
		Tablet: 50 mg	1	1½	2	2½	3	–	–
		Tablet: 200 mg	–	–	–	–	–	1	1
	Once daily for 14 days followed by twice daily								
Protease inhibitors (PIs)									
Lopinavir/ ritonavir (LPV/RTV)	Twice a day	Liquid: 80 mg/20 mg/mL	1 mL	1½ mL	2 mL	2½ mL	3 mL	–	–
		Tablet 100 mg/25 mg	–	–	2 AM 1 PM	2	2	3	–
		Tablet 400 mg/100 mg	–	–	–	–	–	–	–
		Pellets 40 mg/10 mg	2	3	4	5	6	–	1

Drug	Dosage	Form	Dose according to body weight (Note: the weight categories differ from the other drug tables)						
			3–< 6 kg	6–< 10 kg	10–< 14 kg	14–< 20 kg	20–< 25 kg	25–< 35 kg	Adolescents
Atazanavir (ATV)[c,d]	Once a day	Capsule 100 mg	–	–	2	2	2	–	–
		Capsule 200 mg	–	–	1	1	1	–	–
		Capsule 300 mg	–	–	–	–	–	1	1
Darunavir (DRV)[d]	Once a day	Tablet 600 mg	–	–	–	1	1	1	2
		Tablet 150 mg	–	–	–	4	4	1	–
		Tablet 75 mg	–	–	–	5	5	–	–
	Twice a day	Tablet 400 mg	–	–	–	–	–	1	–
		Liquid 100 mg/mL	–	–	2½ mL	3.5 mL	–	–	–
Ritonavir (RTV)[e]	Twice a day	Tablet 25 mg	–	–	–	2	2	–	–
		Tablet 50 mg	–	–	–	1	1	–	–
		Tablet 100 mg	–	–	–	–	–	1	1
		Liquid 80 mg/mL	–	–	½ mL	0.6 mL	–	–	–
Integrase strand transfer inhibitors									
Raltegravir (RAL)	Twice a day	Tablets (chewable) 25 mg	1	2	3	4	6	–	–
		Tablets (chewable) 100 mg	–	–	–	1	1½	–	–
		Tablets (chewable) 400 mg	–	–	–	–	–	1	2
		Liquid 10 mg/mL (Oral granules for suspension: 100 mg/sachet)	3 mL	5 mL	8 mL	10 mL	–	–	–
Dolutegravir (DTG)	Once a day	Tablet 50 mg	–	–	–	–	–	1	1

Table 148. Simplified age-based antiretroviral drug dosing for enhanced post-natal prophylaxis[a]

Drug	Dosage	Form	Dose according to age	
			0–6 weeks	6–12 weeks
Zidovudine (AZT)	Twice a day	Liquid: 10 mg/mL	1½ mL	6 mL
		Tablet 60 mg	–	1
Nevirapine (NVP)	Once a day (AM)	Liquid: 10 mg/mL	1½ mL	2 mL
		Tablet 50 mg	½	½

[a] This simplified dosing was developed using a WHO generic tool based on previously established NVP prophylactic targets. For weight-based dosing of AZT and NVP, see p. 849.

Antibiotics for tuberculosis (TB) treatment

Table 149. Drug and weight band-based dosages of fixed-dose combinations

Essential antiTB drug	Route	Mode of action	Daily dose in mg/kg (range)	Maximum per dose (mg/day)
Isoniazid (H)	Oral	Bactericidal	10 (7–15)[a]	300
Rifampicin (R)	Oral	Bactericidal	15 (10–20)	600
Pyrazinamide (Z)	Oral	Bactericidal	35 (30–40)	–
Ethambutol (E)	Oral	Bacteriostatic	20 (15–25)	–
Streptomycin (S) only for multidrug-resistant tuberculosis	IM	Bactericidal	15 (12–18)	2000

As children approach a body weight of 25 kg, adult dosages can be used.
IM: intramuscular
[a] The higher end of the range for isoniazid dose applies to younger children; the lower end of the dosing range applies to older children.

Table 150. Weight band-based dosages of fixed-dose combinations

Weight band[a]	Number of tablets	
	Intensive phase: RHZ[b] 75/50/150 mg	Continuation phase RH 75/50 mg
4–7 kg	1	1
8–11 kg	2	2
12–15 kg	3	3
16–24 kg	4	4
≥ 25 kg	Adult dosages recommended	

[a] Treatment of infants 0–3 months or below 4 kg should be undertaken by a clinician experienced in managing paediatric TB. If not available, and TB has been definitely diagnosed or is strongly suspected, treatment with the standard regimen may be considered.

[b] Ethambutol should be added in the intensive phase for children with extensive disease or living in areas with a high prevalence of HIV or isoniazid resistance.

Notes

ANNEX 5

Comparison of systemic corticosteroids

The following table shows the properties and equivalent doses of systemic corticosteroidsin relation to hydrocortisone.

	Equivalent doses (mg)	Relative glucocorticoid activity	Relative mineralocorticoid activity	Duration of action (hours)
SHORT-ACTING GLUCOCORTICOIDS				
Hydrocortisone	20	1	1	8–12
Cortisone	25	0.8	0.8	8–12
INTERMEDIATE-ACTING GLUCOCORTICOIDS				
Prednisone	5	4	0.8	12–36
Prednisolone	5	4	0.8	12–36
Methylprednisolone	4	5	0.5	12–36
Triamcinolone	4	5	0	12–36
LONG-ACTING GLUCOCORTICOIDS				
Dexamethasone	0.75	30	0	36–72
Betamethasone	0.60	30	0	36–72
MINERALOCORTICOIDS				
Fludrocortisone	[a]	10–15	125–150	12–36

[a] Prednisone or prednisolone given at doses of 50 mg per day or hydrocortisone given at 20 mg per day provide a mineralocorticoid effect that is approximately equivalent to 0.1 mg fludrocortisone.

ANNEX 6

Oral rehydration solution (ORS)

The four ingredients of oral rehydration solution (glucose, sodium chloride, potassium chloride and trisodium citrate) in the concentrations described below yield an effective solution for rehydration and the prevention of dehydration.

ORS components	g/L	ORS components	mmol/L
Sodium chloride	2.6	Sodium	75
		Chloride	65
Potassium chloride	1.5	Potassium	20
Glucose, anhydrous	13.5	Glucose, anhydrous	75
Trisodium citrate, dihydrate	2.9	Citrate	10
		Total osmolarity	**245**

Components of ORS work in the following way:

- Glucose facilitates the absorption of sodium (and hence water) on a 1:1 molar basis in the small intestine
- Sodium and potassium replace the body losses of these essential ions during diarrhoea (and vomiting)
- Citrate corrects the acidosis that occurs as a result of diarrhoea and dehydration.

ANNEX 7

Intravenous fluids

The following table gives the composition of IV fluids that are commercially available and commonly used for newborns, infants and children. For a decision on which fluid to use in particular circumstances, see the disease-specific chapters, e.g. for shock (p. 734). Please note that none of these fluids contains sufficient calories for the long-term nutritional support of children, and some fluids contain less than others. When feed and fluids can be given by mouth or nasogastric tube, this is the preferred and safest route.

	Composition						
	Na+	K+	Cl–	Ca++	Lactate	Glucose	Calories
IV fluid	mmol/L	mmol/L	mmol/L	mmol/L	mmol/L	g/L	cal/L
Ringer's lactate (Hartmann's)	130	5.4	112	1.8	27	–	–
Normal saline (0.9% NaCl)	154	–	154	–	–	–	–
10% glucose	–	–	–	–	–	100	400
0.45% NaCl/5% glucose	77	–	77	–	–	50	200
Darrow's solution	121	35	103	–	53	–	–
Half-strength Darrow with 5% glucose[a]	61	17	52	–	27	50	200
Half-strength Ringer's lactate with 5% glucose	65	2.7	56	1	14	50	200
0.18% NaCl/4% glucose[b]	31	–	31	–	–	40	160
5% glucose[b]	–	–	–	–	–	50	200

[a] Half-strength Darrow's solution often comes without glucose, and glucose must be added before use.

[b] These fluids can be used mainly in the first few days of life but not in other infants or children.

ANNEX 8

Asthma action plan

Below an example of an asthma action plan for a patient or caregiver:

If your asthma is well controlled

You need your reliever less than 3x/week, you do not wake up with asthma, you can do your normal activities (including exercise)

Controller medication:

Name .....

Strength .....

Take ..... puffs/tablet ..... times **every** day

Reliever medication:

Name .....

Strength .....

Take ..... puffs if needed to relieve asthma symptoms.

Other medication (name, strength, how often):

.....

.....

.....

Before exercise take (name, strength, how many puffs/tablets):

.....

.....

.....

.....

If your asthma is getting worse

You need your reliever more often than usual, wake up with asthma, cannot do your normal activities (including exercise)

Controller medication:

Name .....

Strength .....

Take ..... puffs/tablet ..... times **every** day

Reliever medication:

Name .....

Strength .....

Take ..... puffs if needed to relieve asthma symptoms.

Other medication (name, strength, how often):

.....

.....

.....

If your asthma symptoms are severe:

You need your reliever more often than every 3–4 hours, your breathing is difficult, you often wake up with asthma

Take your reliever medication:

Name .....

Strength .....

Take ..... puffs/tablet ..... times **every** day

Take prednisone/prednisolone:

Name .....

Strength .....

Take ..... tablet ..... times **every** day

Contact a doctor today or go directly to the emergency department!

Doctor's contact details .....

In an emergency call .....
(emergency contact person) or call an ambulance immediately.

ANNEX 9

Hypersensitivity reactions

Allergic and other hypersensitivity reactions to drugs are not uncommon. Drug reactions can be divided into two broad categories based on the initial onset of signs and symptoms. It is important to differentiate between these categories when deciding whether the drug which may have caused the reaction should be further used.

	Immediate, rapidly evolving reaction (IgE-mediated): type I	**Delayed or non-immediate reaction (non-IgE-mediated): types II, III, IV**
Onset	Within < 1 h of drug intake	> 1 h after drug intake (usually after 6 h but up to several days)
Clinical presentation	• Anaphylaxis: skin signs (rash, urticaria, angioedema) with systemic signs (hypotension, bronchospasm, but also vomiting, diarrhoea) • Urticaria or angioedema without systemic signs • Exacerbation of asthma	• Rash with no systemic signs • Drug reaction with eosinophilia and systemic symptoms • Toxic epidermal necrolysis or Stevens-Johnson syndrome

ANNEX 10

Equipment sizes for young children

Appropriate sizes of paediatric equipment according to age (weight) of child

Equipment	0–5 months (3–6 kg)	6–12 months (4–9 kg)	1–3 years (10–15 kg)	4–7 years (16–20 kg)
AIRWAY AND BREATHING				
Laryngoscope	Straight blade	Straight blade	Child Macintosh	Child Macintosh
Uncuffed tracheal tube	2.5–3.5	3.5–4.0	4.0–5.0	5.0–6.0
Stylet	Small	Small	Small/ medium	Medium
Suction catheter (French gauge)	6	8	10	12
CIRCULATION				
IV cannula	24/22	22	22/18	20/16
OTHER EQUIPMENT				
Nasogastric tube[a]	8	10	10–12	12
Urinary catheter[a]	5 feeding tube	5 feeding tube/F8	Foley 8	Foley 10

[a] Sizes in French gauge or Charrière, which are equivalent and indicate the circumference of the tube in millimetres.

Notes

Index

All index entries relate to infants/children unless otherwise mentioned e.g. for newborn infants, or adolescents.

Index entries are in letter-by-letter alphabetical order, with the exception of index entries relating to Developmental milestones, in which case the subentries are in order of age.

A

B

C

D

E

F

G

H

L

M

N

O

P

Q

R

S

T

U

V

W

Y

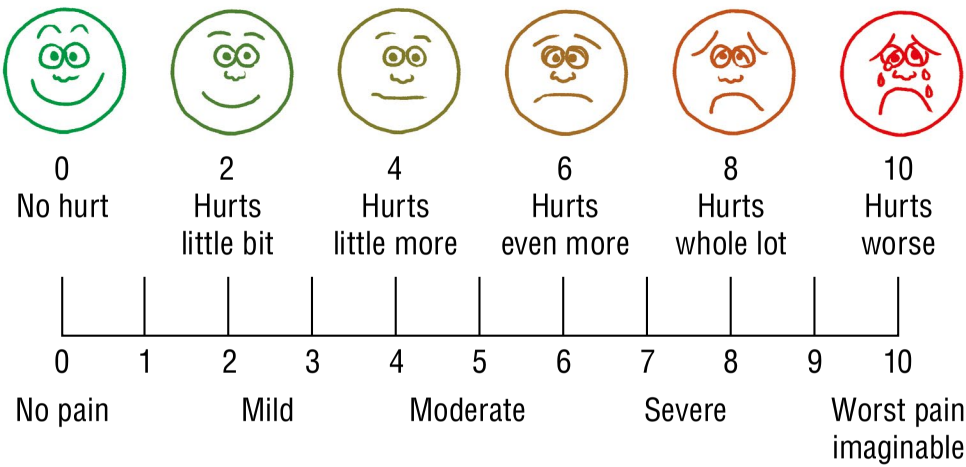
Z

LIST OF LOCAL CONTACT NUMBERS

Fill in the blanks with your country or region's local numbers:

	CONTACT DETAILS (NUMBERS AND EMAIL)	
Emergencies	Emergency dial	
	Poison control centre	
	Suicide action hotline	
	Referral hospital	
Specialists and coordination	Ophthalmologist	
	Cardiologist	
	Neurologist	
	Otolaryngologist	
	Dentist	
	Psychologist	
	Psychiatrist	
	Orthopaedic surgeon	
	Palliative care specialist	
	Dermatologist	
	Nutritionist	
	Pharmacy	
	Laboratory	
	Microbiology	
Social services and child protection	Child protection services	
	Shelters	
	Transport services	
	Social workers	
	Social paediatric centre	
	Financial support services	
	Educational services	
	Legal services	
	Home health care services	
	Psychosocial support groups	
	Mental health support line	
Rehabilitation	Speech therapist	
	Physiotherapist	
	Nutritionist	
	Orthotic specialist	
Other		

Pain scale


0
No hurt
2
Hurts little bit
4
Hurts little more
6
Hurts even more
8
Hurts whole lot
10
Hurts worse
0 1 2 3 4 5 6 7 8 9 10
No pain
Mild
Moderate
Severe
Worst pain imaginable

EMERGENCY DRUGS

Epinephrine (adrenaline)

- *Anaphylaxis:* 0.15 mL 1:1000 solution IM (0.3 mL for children > 6 years)
- *Severe croup:* nebulize with 0.5 mL/kg 1:1000 solution (max. 5 mL/dose)
- *Cardiac arrest:* 0.01 mg/kg (= 0.1 mL/kg 1:10 000 solution) every 3–5 min IV or intraosseous (max. 1 mg = 10 mL/dose)

Glucose: 3 mL/kg 10% glucose solution rapidly IV

Oxygen: start oxygen flow at 1–2 L/min (0.5 L/min for young infants) by nasal prongs to aim for an oxygen saturation of 94–98%

Naloxone: 10 µg/kg IV (max. 400 µg/dose)

Diazepam *(for convulsions)*: rectal 0.5 mg/kg (max. 20 mg/dose); IV: 0.2 mg/kg (max. 10 mg/dose)

Midazolam *(for convulsions)*: nasal/buccal or IM 0.2 mg/kg (max. 10 mg/dose); IV: 0.15 mg/kg (max. 7.5 mg/dose)

Phenobarbital *(for convulsions in newborns)*: 20 mg/kg IV

Levetiracetam *(for convulsions > 20 min)*: 40–60 mg/kg IV (max. 4.5 g/dose) over 15 min or **phenytoin** 20 mg/kg IV (max. 1.5 g/dose) over 20 min

NORMAL RANGES OF VITAL SIGNS

Normal range of vital signs (5th–95th percentiles)

Age	Approx. weight (kg)[a]	Respiratory rate (breaths/min)	Heart rate (beats/min)	Systolic blood pressure (mmHg)[b]
1 month	3–5	25–60	110–180	50–100
1 year	10	20–50	100–170	70–105
2 years	12	18–40	90–160	70–105
5 years	18	17–30	70–140	75–110
10 years	30	14–25	60–120	80–120
> 15 years	50	12–18	60–100	100–130

[a] Estimated weight for ≥ 1 year: (age + 4) x 2
[b] Minimum systolic blood pressure (mmHg): 70 + (age x 2)

This *Pocket Book* is for use by doctors, nurses and other health workers who are responsible for the care of children and adolescents at the primary health care level. It summarizes guidance on how to manage – and when to refer – children and adolescents presenting with common complaints and conditions. It includes information to enable primary health care providers to coordinate the continued care of children and adolescents with long-term conditions and diseases managed by specialists. Preventive and promotive measures from the newborn period to adolescence include advice on the timing and content of well-child visits, the promotion of early childhood development and health messages for adolescents.

This *Pocket Book* aims to improve the diagnosis and management of common conditions in children and adolescents that can be managed at the outpatient level. It helps to improve the use of laboratory and other diagnostic measures and the rational use of essential drugs and equipment. For children requiring referral, it links to its sister publication, the *Pocket Book of Hospital Care for Children*. Both are presented in a handy format for daily work to help guide examination, case management and counselling.

The recommendations of this *Pocket Book* apply across the WHO European Region and may be adapted by countries to suit their specific circumstances. The *Pocket Book* summarizes information from existing WHO and other evidence-based guidelines. Details of the evidence on which it is based can be found on the WHO/EURO website. It will be updated regularly as new evidence emerges.

The *Pocket Book* enables health care providers to deliver on the promise of quality primary health care. Its focus on evidence-based practices and prevention ensures that children and adolescents receive the care they need and avoids unnecessary treatment and hospitalization.

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