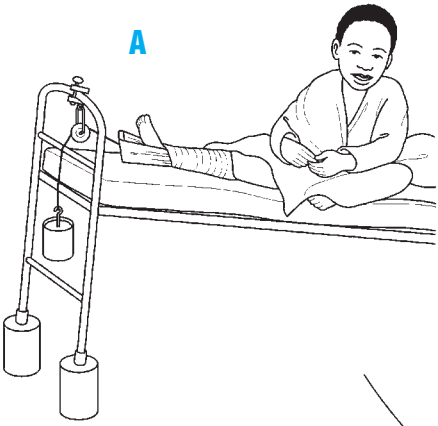
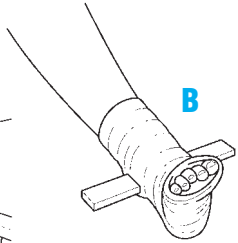
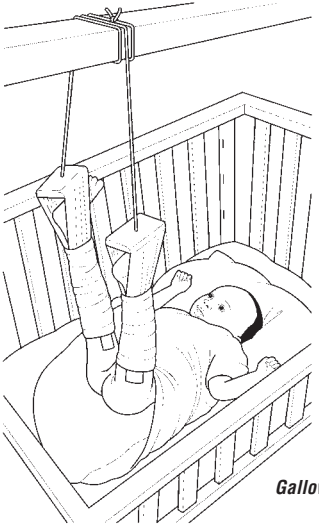


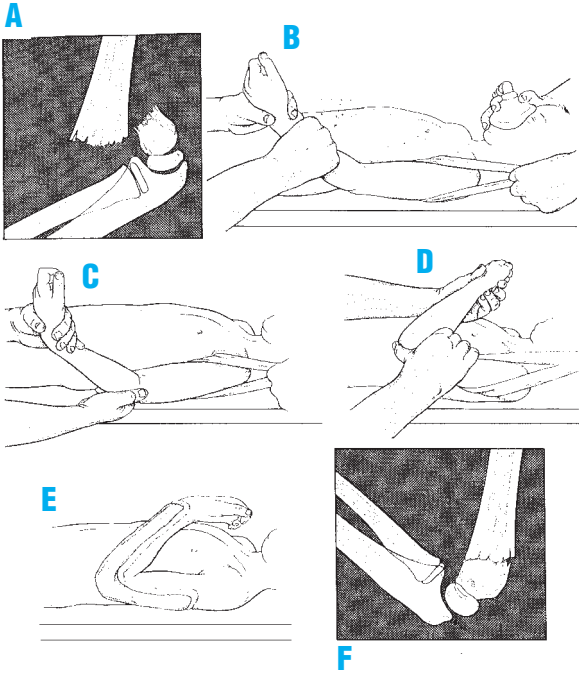
A: Lower extremity skin traction

B: Prevention of rotational deformity can be achieved by adding a piece of wood to a foot plaster.





Gallows traction



Treatment of a supracondylar fracture

A. X-ray of displaced supracondylar fracture
B. Pull as shown to reduce the fracture displacement.
C. Carefully bend the elbow, maintaining traction.
D. Hold the elbow flexed, and keep the fracture in position as shown.
E. Apply a back slab.
F. Check the position of the fracture on an X-ray.

Treatment of a supra-condylar fracture is shown on the previous page. An important complication of this fracture is constriction of the artery at the elbow, where it can become entrapped. Assess the blood flow to the hand. If the artery is obstructed, the hand will be cool, capillary refill will be slow and the radial pulse will be absent. If the artery is obstructed, reduction must be done urgently.

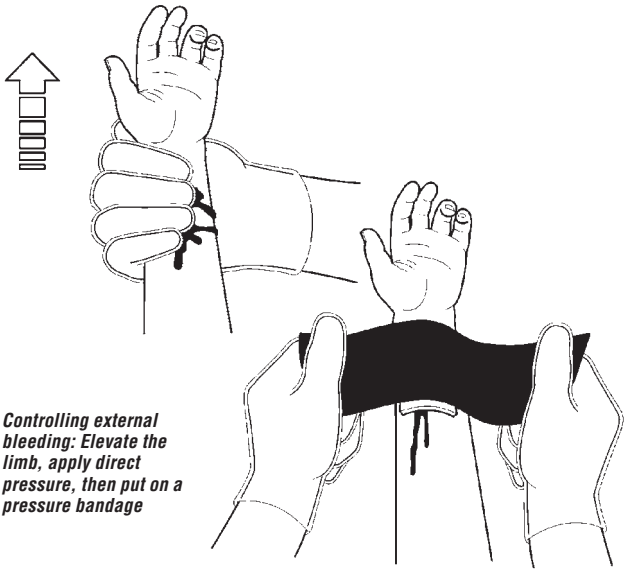
A mid-shaft femoral fracture in a child < 3 years of age is treated with a gallows splint (see figure on p. 277). Every few hours, the attendant should check that the circulation of the feet is good and the toes are warm.

Treatment of a mid-shaft femoral fracture in an older child is skin traction (see figure A on p. 277). This is a simple, effective method for treating femur fractures in children aged 3–15 years. If the child can raise his or her leg off the bed, the fracture has united and the child is ready for ambulation on crutches (usually after about 3 weeks).

9.3.6 Principles of wound care

Wounds are common surgical problems in children. The goal of caring for any wound is to stop bleeding, prevent infection, assess damage to underlying structures and promote healing. More detailed surgical guidance is given in the WHO manual *Surgical care in the district hospital*.

- Stop bleeding
  - Direct pressure will control any bleeding (see figure on p. 280).
  - Bleeding from extremities can be controlled for periods of not more than 10 min with a sphygmomanometer cuff inflated above the arterial pressure.
  - Prolonged use (> 10 min) of tourniquets can damage the extremity. Never use a tourniquet in a child with sickle-cell anaemia.
- Prevent infection
  - Cleaning the wound is the most important way of preventing wound infection. Most wounds are contaminated when first seen. They may contain blood clots, dirt, dead or dying tissue and perhaps foreign bodies.
  - Clean the skin around the wound thoroughly with soap and water or antiseptic. Pour water and antiseptic into the wound.
  - After giving a local anaesthetic such as lidocaine (≤ 3 mg/kg) or 0.25% bupivacaine (≤ 1 ml/kg) by infiltration around the wound, search carefully for foreign bodies, and excise any dead tissue. Determine what damage may have been done. Major wounds require a general anaesthetic.



Controlling external bleeding: Elevate the limb, apply direct pressure, then put on a pressure bandage

- Antibiotics are usually not necessary when wounds are carefully cleaned; however, some wounds should be treated with antibiotics:
  - wounds older than 12 h (likely to be already infected)
  - wounds penetrating deep into tissue (e.g. a dirty stick, knife wound or animal bite)

▶ Tetanus prophylaxis

- If the child is not vaccinated, give anti-tetanus serum, if available, and start a course of tetanus toxoid vaccine.
- If the child has had active immunization, give a booster if vaccination status is not current.

▶ Wound closure

- If the wound is < 1 day old and has been cleaned satisfactorily, it can be closed ('primary closure').

- The wound should not be closed if it is > 24 h old, it contained a lot of dirt and foreign material or it was caused by an animal bite.
- Wounds not treated with primary closure should be packed lightly with damp sterile gauze. If the wound is clean 48 h later, it can be closed (delayed primary closure).
- If the wound is infected, pack it lightly and let it heal on its own.

▶ Wound infections
- Clinical signs: pain, swelling, redness, warmth and pus drainage
- Treatment:
  - Open the wound if pus is suspected.
  - Clean the wound with disinfectant.
  - Pack the wound lightly with damp sterile gauze. Change the dressing every day and more frequently if needed.
  - Give antibiotics until surrounding cellulitis has resolved (usually 5 days).

▶ Give cloxacillin (25–50 mg/kg orally four times a day) for most wounds to treat possible *S. aureus* infection.

▶ Give ampicillin (25–50 mg/kg orally four times a day), gentamicin (7.5 mg/kg IM or IV once a day) plus metronidazole (7.5 mg/kg three times a day) if bowel flora are suspected.

9.4 Abdominal problems

9.4.1 Abdominal pain

Not all abdominal pain is caused by gastrointestinal infections. Abdominal pain lasting > 4 h should be regarded as a potential abdominal emergency.

Assessment

■ Ask three questions:
- Are there associated symptoms? The presence of nausea, vomiting, diarrhoea, constipation, fever, cough, headache, sore throat or dysuria (pain on passing urine) helps determine the severity of the problem and can narrow the diagnosis.
- Where does it hurt? Ask the child to point to where it hurts most. This can also narrow the diagnosis. Periumbilical pain is nonspecific.
- Does the child have peritonitis? This is a critical question, as most causes of peritonitis in children require surgery.

- Signs of peritonitis include tenderness during palpation, pain in the abdomen, especially on movement, and involuntary guarding (spasm of the abdominal musculature on palpation). A rigid abdomen that does not move with respiration is another sign of peritonitis. Absent bowel sounds through a stethoscope on the abdomen is a strong indicator.

Treatment

- Give the child nothing orally.
- If the child is vomiting or has abdominal distension, place a nasogastric tube.
- Give IV fluids. Correct shock, if present, with 20 ml/kg normal saline or Hartmann's solution as a rapid IV bolus (see Chart 7, p. 13). If shock persists, repeat the IV bolus of 20 ml/kg, but watch carefully for circulatory fluid overload. If there is no shock but the child is dehydrated, give 10–20 ml/kg half-strength Darrow solution or normal saline plus 5% glucose over 20 min, and give 150% maintenance fluid requirements (see p. 304).
- Give analgesics if the pain is severe (This will not mask a serious intra-abdominal problem and may facilitate examination).
- Repeat the examinations if the diagnosis is in question.
- Give antibiotics if there are signs of peritonitis. To deal with enteric flora (Gram-negative rods, enterococci and anaerobes), give ampicillin (25–50 mg/kg IM or IV four times a day), gentamicin (7.5 mg/kg IM or IV once a day) and metronidazole (10 mg/kg three times a day).

Urgent review by a surgeon experienced in paediatric surgery is required.

9.4.2 Appendicitis

Appendicitis is due to obstruction of the lumen of the appendix. Faecoliths, lymphoid hyperplasia and gastrointestinal parasites can cause obstruction. If appendicitis is not recognized, the appendix ruptures, leading to peritonitis and abscess formation.

Diagnosis

This is very difficult, especially in young children.

- fever, anorexia, vomiting (variable)
- may begin as periumbilical pain, but the most important clinical finding is persistent pain and tenderness in the right lower quadrant.
- may be confused with urinary tract infections, kidney stones, ovarian problems, mesenteric adenitis, ileitis

A raised white blood cell count can be helpful. Ultrasound examination by a skilled observer can be very helpful.

Treatment

- Give the child nothing orally.
- Give IV fluids.
  - Correct shock, if present, with 20 ml/kg normal saline or Hartmann's solution as a rapid IV bolus (see p. 13). If shock persists, repeat the IV bolus of 20 ml/kg, but watch carefully for circulatory fluid overload. If the child is not in shock but is dehydrated, give 10–20 ml/kg half-strength Darrow solution or normal saline plus 5% glucose over 20 min.
- Give antibiotics once the diagnosis is established: ampicillin (25–50 mg/kg IM or IV four times a day), gentamicin (7.5 mg/kg IM or IV once a day) and metronidazole (10 mg/kg three times a day).
- **Urgent review** by a surgeon experienced in paediatric surgery is required. Appendectomy should be done as soon as possible to prevent perforation, peritonitis and abscess formation. It is better to operate and be wrong about the diagnosis than to delay and have peritonitis occur.

9.4.3 Bowel obstruction after the neonatal period

Bowel obstruction may be due to incarcerated hernias, adhesions (scarring from previous surgery), *Ascaris* infection or intussusception (see section 9.4.4).

Diagnosis

- Clinical presentation is determined by the level of obstruction. Proximal obstruction presents with vomiting with minimal distension. Distal obstruction presents with distension, with vomiting occurring later.
- Typically, there is cramping abdominal pain, distension and no flatus.
- Sometimes, peristalsis waves can be seen through the abdominal wall.
- Abdominal X-rays show distended loops of bowel with air fluid levels.

Treatment

- Give the child nothing orally.
- Give fluid resuscitation. Most children presenting with bowel obstruction have been vomiting and are dehydrated.
- Correct shock, if present, with 20 ml/kg normal saline or Hartmann's solution as a rapid IV bolus (see p. 13). If shock persists, repeat the IV bolus of

20 ml/kg, but watch carefully for circulatory fluid overload. If the child is not in shock but is dehydrated, give 10–20 ml/kg half-strength Darrow solution or normal saline plus 5% glucose over 20 min.

- Pass a nasogastric tube to relieve nausea and vomiting and prevent bowel perforation by keeping the bowel decompressed.
- **Urgent review** by a surgeon experienced in paediatric surgery is required.

9.4.4 Intussusception

Intussusception is a form of bowel obstruction in which one segment of the intestine telescopes into the next. It occurs most commonly at the ileal–caecal junction.

Diagnosis

- Usually occurs in children < 2 years of age, but can occur in older children.
- Clinical presentation:
  - Early: colicky abdominal pain with vomiting. The child cries with pain, doubles over, and pulls the legs up.
  - Late: pallor, abdominal distension, tenderness, bloody diarrhoea ('red currant jelly stool') and dehydration.
- Palpable abdominal mass (begins in right lower quadrant and may extend along line of colon).

Treatment

- Arrange **urgent review** by a surgeon experienced in paediatric surgery. Proceed to an operation if air or a barium enema is unable to reduce the intussusception. If the bowel is ischaemic or dead, bowel resection will be required.

Transfer the patient if there is no one with experience in reducing an intussusception with an air or barium enema, or X-ray facilities are not available.

To reduce an intussusception, an unlubricated 35-ml Foley catheter is passed into the rectum; the bag is inflated, and the buttocks strapped together. A warm solution of barium in normal saline is allowed to flow under gravity from a height of 1 m, and its entrance into the colon is observed on an abdominal X-ray. The diagnosis is confirmed when the barium outlines a concave 'meniscus'. The pressure of the column of barium slowly reduces the intussusception; the reduction is complete only when several loops of small bowel are seen to fill with barium.

- Pass a nasogastric tube.
- Give fluid resuscitation. Correct shock, if present, with 20 ml/kg normal saline or Hartmann's solution as a rapid IV bolus (see p. 13). If shock persists, repeat the IV bolus of 20 ml/kg, but watch carefully for circulatory fluid overload. If the child is not in shock but is dehydrated, give 10–20 ml/kg half-strength Darrow's solution or normal saline plus 5% glucose over 20 min.
- Give antibiotics if there are signs of infection (fever, peritonitis). Give ampicillin (25–50 mg/kg IM or IV four times a day), gentamicin (7.5 mg/kg IM or IV once a day) and metronidazole (10 mg/kg three times a day). The duration of post-operative antibiotics depends on the severity of disease: in an uncomplicated intussusception reduced with an air enema, give for 24–48 h postoperatively; in a child with a perforated bowel with resection, continue antibiotics for 7–14 days, depending on response.

9.4.5 Umbilical hernia

Diagnosis

- Soft reducible swelling at umbilicus

Treatment

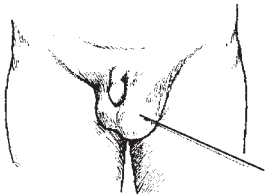
Most close spontaneously.

- Repair if not closed by the age of 6 years, or if there is a history of the hernia being difficult to reduce.

9.4.6 Inguinal hernia

Diagnosis

- Intermittent reducible swelling in the groin observed when the child is crying or straining.
- Occurs where the spermatic cord exits the abdomen (inguinal canal).
- Distinguish from a hydrocoele (fluid that collects around a testicle due to a patent processus vaginalis). Hydrocoeles transilluminate and usually do not extend up into the inguinal canal.
- Occurs rarely in girls



Swelling when the child coughs

Treatment

- Uncomplicated inguinal hernia: elective surgical repair to prevent incarceration
- Hydrocoele: repair if not resolved by the age of 1 year. Unrepaired hydrocoeles can become inguinal hernias.

9.4.7 Incarcerated hernia

These occur when the bowel or other intra-abdominal structure (e.g. omentum) is trapped in the hernia.

Diagnosis

- Non-reducible tender swelling at the site of an inguinal or very rarely an umbilical hernia
- There may be signs of intestinal obstruction (vomiting and abdominal distension) if the bowel is trapped in the hernia.

Treatment

- **Urgent review** by a surgeon experienced in paediatric surgery is required.
- Attempt to reduce the hernia by steady constant pressure, provided that there are no signs of strangulation or perforation. If the hernia does not reduce easily, an operation will be required.
- Give the child nothing orally.
- Give IV fluids.
- Pass a nasogastric tube if there is vomiting or abdominal distension.
- Give antibiotics if compromised bowel is suspected: give ampicillin (25–50 mg/kg IM or IV four times a day), gentamicin (7.5 mg/kg IM or IV once a day) plus metronidazole (10 mg/kg three times a day).

9.4.8 Testicular torsion

Torsion of a testis produces an acute swelling in one side of the scrotum. There is severe pain, and the testis is extremely tender to the touch.

If the testis is to be preserved, urgent surgical treatment is needed (if done within 6 h, 90% will be successful).

Differential diagnoses include an incarcerated hernia (which extends up into the inguinal canal and its upper limit cannot be felt) and epididymo-orchitis (which is rare in young children).

9.4.9 Rectal prolapse

Rectal prolapse is caused by straining during a bowel motion and is associated with chronic diarrhoea and poor nutrition. Causative factors include gastrointestinal parasites (such as *Trichuris*) and cystic fibrosis.

Diagnosis

- The prolapse occurs on defaecation. Initially, the prolapsed section reduces spontaneously, but later it may require manual reduction.
- May be complicated by bleeding or even strangulation, with gangrene

Treatment

- If the prolapsed rectum is not dead (it is pink or red and bleeds), reduce with gentle constant pressure.
- Apply firm strapping across the buttocks to maintain the reduction.
- Correct the underlying cause of diarrhoea and malnutrition.
- Treat for a helminth infection (such as mebendazole at 100 mg orally twice a day for 3 days or 500 mg once only).
- **Review** by a surgeon experienced in paediatric surgery is required. Recurrent prolapse may require a Thiersch stitch.

9.5 Infections requiring surgery

9.5.1 Abscess

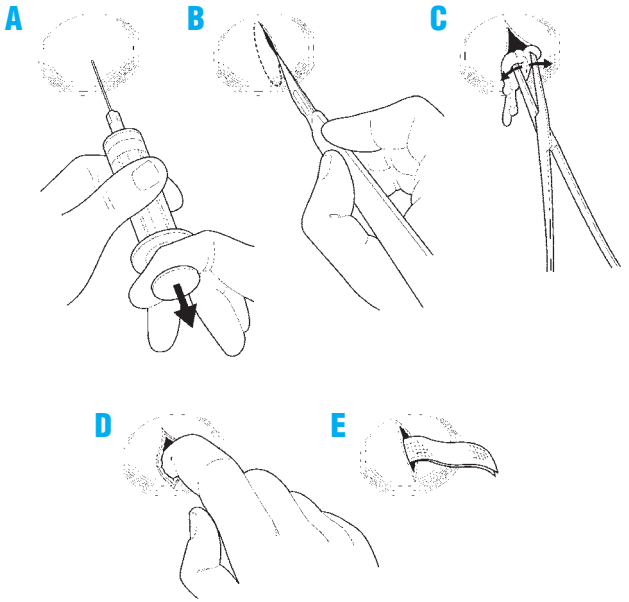
Infection can cause a collection of pus in almost any area of the body.

Diagnosis

- Fever, swelling, tenderness and a fluctuant mass.
- Determine the cause of the abscess (e.g. injection, foreign body or underlying bone infection). Injection abscesses usually develop 2–3 weeks after an injection.

Treatment

- Incision and drainage (see figure on p. 288).
- Incision and drainage of large abscesses may require general anaesthesia.
- Antibiotics: cloxacillin (25–50 mg/kg four times a day) for 5 days or until surrounding cellulitis resolves. If bowel flora are suspected (e.g. perirectal



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*

abscess), give ampicillin (25–50 mg/kg IM or IV four times a day), gentamicin (7.5 mg/kg IM or IV once a day) plus metronidazole (10 mg/kg three times a day).

9.5.2 Osteomyelitis

Infection of a bone usually results from blood spread (see p. 186). It may also occur in open fractures. The commonest organisms include *S. aureus*, *Salmonella* (in sickle-cell disease) and *Mycobacterium tuberculosis.*

Diagnosis

- Acute osteomyelitis:
  - pain and tenderness of the involved bone
  - usually, intermittent fever
  - refusal to move the affected limb
  - refusal to bear weight if in the leg

In early osteomyelitis, the X-ray may be normal; it usually takes 12–14 days for X-ray changes to appear.

- Chronic osteomyelitis
  - chronic draining sinuses over the involved bone
  - X-ray shows elevated periosteum and sequestrum (collection of dead bone).

Treatment

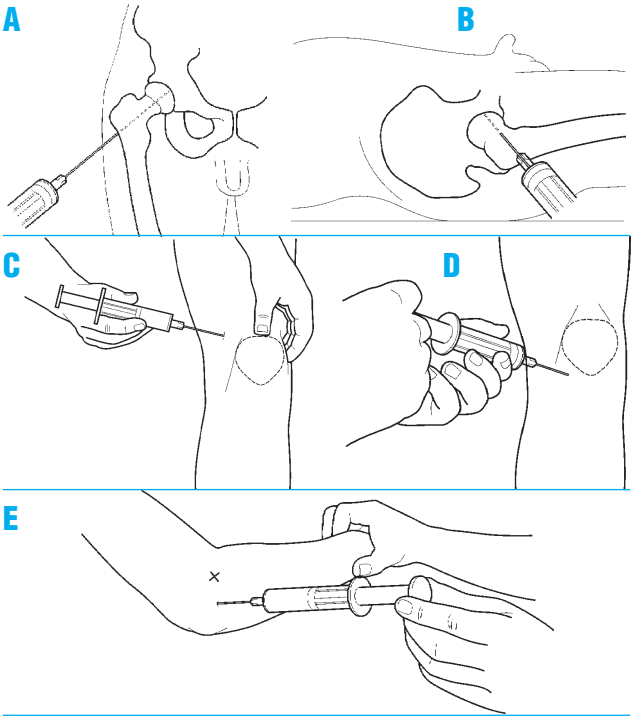
- **Review** by a surgeon experienced in paediatric surgery is required.
- In early osteomyelitis with fever and toxaemia, give chloramphenicol (25 mg/kg three times a day) to children aged < 3 years and those with sickle-cell disease; or give cloxacillin (50 mg/kg IM or IV four times a day) to children aged > 3 years for at least 5 weeks. Give parenteral antibiotics until the child has improved clinically, then orally to complete the course.
- In chronic osteomyelitis, sequestrectomy (removal of dead bone) is usually necessary as well as antibiotic treatment, as above.

9.5.3 Septic arthritis

This condition is similar to osteomyelitis, but involves the joint. (See p. 186.)

Diagnosis

- Pain and swelling of the joint.
- Usually, intermittent fever
- Examination of the joint shows two important physical signs:
  - swelling and tenderness over the joint
  - decreased range of movement



Techniques for aspirating hip (A,B), knee (C,D) and elbow (E) joints

Treatment

- Aspiration of the joint to confirm the diagnosis (see figure, above). The commonest organism is *S. aureus*. Aspiration should be done under sterile conditions.
- **Urgent review** by a surgeon experienced in paediatric surgery is required for washing out the joint. Pus under pressure destroys a joint.

- Give chloramphenicol (25 mg/kg three times a day) to children aged < 3 years and those with sickle cell disease; or give cloxacillin (50 mg/kg IM or IV four times a day) to children aged > 3 years for at least 3 weeks. Give parenteral antibiotics until the child has improved clinically, then orally to complete the course

9.5.4 Pyomyositis

In this condition, there is pus within the substance of a muscle.

Diagnosis

- Fever, tenderness and swelling of the involved muscle. A fluctuant mass may not be detected if the inflammation is deep in the muscle.
- Commonly occurs in the thigh

Treatment

- Incision and drainage (usually require general anaesthesia)
- Leave a drain in the abscess cavity for 2–3 days.
- X-ray to exclude underlying osteomyelitis
- Give cloxacillin (50 mg/kg IM or IV four times a day) for 5–10 days, as the commonest organism is *S. aureus*.

Notes

Notes

CHAPTER 10

Supportive care

In order to provide good inpatient care, hospital policies and working practices should promote the basic principles of child care, such as:

- communicating with the parents
- arranging the paediatric ward so that the most seriously ill children receive the closest attention and are close to oxygen and other emergency treatments
- keeping the child as comfortable as possible and controlling pain, especially in invasive procedures
- preventing the spread of hospital-acquired infection by encouraging staff to wash their hands regularly and other measures
- keeping warm the area in which young infants or children, especially those with severe malnutrition, are being looked after, in order to prevent complications like hypothermia.

10.1 Nutritional management

Health workers should follow the advice on counselling in sections 12.3 and 12.4 (pp. 322–4). A mother's card with pictures of the advice can be helpful for the mother to take home as a reminder (see Annex 6, p. 403).

10.1.1 Supporting breastfeeding

Breastfeeding is most important for protecting infants from illness and for their recovery from illness.

- Exclusive breastfeeding is recommended from birth until 6 months of age.
- Continued breastfeeding, with adequate complementary foods, is recommended from 6 months to ≥ 2 years.

Health workers treating sick young children have the responsibility to encourage mothers to breastfeed and to help them overcome any difficulties.

Assessing a breastfeed

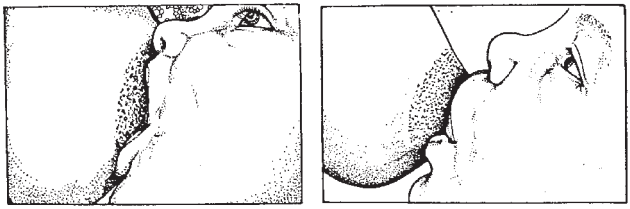
Take a breastfeeding history by asking about the infant's feeding and behaviour. Observe the mother while breastfeeding to decide whether she needs help. Observe:

- how the infant is attached to the breast (see next page). Signs of good attachment are:
  - areola visible above infant's mouth
  - mouth wide open
  - lower lip turned out
  - infant's chin touching the breast
- how the mother holds her infant (see next page)
  - should be held close to the mother
  - should face the breast
  - body should be in a straight line with the head
  - whole body should be supported
- how the mother holds her breast

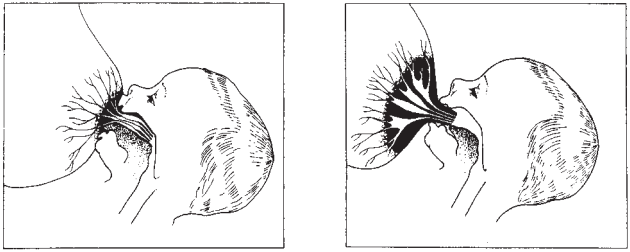
Overcoming difficulties

1. 'Not enough milk'

Almost all mothers can produce enough breast milk for one or even two infants; however, sometimes an infant is not getting enough breast milk. The signs are:



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

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

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

Common reasons why an infant may not be getting 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 other fluids
- psychological factors in the mother: lack of confidence, worry, stress, depression, dislike of breastfeeding, rejection of infant, 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)
- infant'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:

- keeping the infant close to her and not giving him or her to other carers
- ensuring plenty of skin-to-skin contact between the mother and the infant at all times
- offering the infant her breast whenever the infant is willing to suckle
- helping the infant to take the breast by expressing breast milk into the infant's mouth, and positioning the infant so that he or she can easily attach to the breast
- avoiding use of bottles, teats and pacifiers. If necessary, express the breast milk and give it by cup. If this cannot be done, artificial feeds may be needed until an adequate milk supply is established.

2. How to increase the milk supply

The main way to increase or restart the supply of breast milk is for the infant 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 by 30–60 ml per day as the mother's breast milk starts to increase. Monitor the infant's weight gain.

3. Refusal or reluctance to breastfeed

The main reasons why an infant might refuse to breastfeed are:

- The infant is ill, in pain or sedated.
  - If the infant is able to suckle, encourage the mother to breastfeed more often. If the infant is very ill, the mother may need to express breast milk and feed by cup or gastric tube until the infant can breastfeed again.
  - If the infant is in hospital, arrange for the mother to stay with the infant in order to breastfeed.
  - Help the mother to find a way to hold her infant without pressing on a painful place.
  - Explain to the mother how to clear a blocked nose. Suggest short feeds, more often than usual, for a few days.
  - A sore mouth may be due to *Candida* infection (thrush) or teething. Treat the infection with nystatin (100 000 U/ml) suspension. Give 1–2 ml dropped into the mouth four times a day for 7 days. If this is not available, apply 1% gentian violet solution. Encourage the mother of a teething infant to be patient and keep offering the breast.
  - If the mother is on regular sedation, reduce the dose or try a less sedating alternative.
- There is difficulty with the breastfeeding technique
  - Help the mother with her technique: ensure that the infant is positioned and attached well without pressing on the infant's head or shaking 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 infant is not able to suckle, help the mother to express her milk.
  - Help reduce oversupply. If an infant is poorly attached and suckles ineffectively, the infant may breastfeed more frequently or for a longer time, stimulating the breast so that more milk is produced than required. Oversupply may also occur if a mother tries to make her infant feed from both breasts at each feed, when this is not necessary.
- A change has upset the infant.

  Changes such as separation from the mother, a new carer, 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 infant and cause refusal to breastfeed.

Low-birth-weight and sick infants

Infants with a birth weight < 2.5 kg need breast milk even more than larger infants; often, however, they cannot breastfeed immediately after birth, especially if they are very small.

For the first few days, an infant may not be able to take oral feeds and may have to be fed IV. Initiate early feeding with small oral feeds even on day 1 or as soon as the infant can tolerate enteral feeds.

Very low-birth-weight infants (< 1.5 kg) may have to be fed by naso- or orogastric tube during the first days of life. Preferably give the mother's expressed breast milk. The mother can let the infant suck on her cleaned finger while being tube fed. This may stimulate the infant's digestive tract and help weight gain.

Low-birth-weight infants at ≥ 32 weeks' gestational age can start suckling on the breast. Let the mother put her infant to the breast as soon as the infant is well enough. Continue giving expressed breast milk by cup or tube to make sure that the infant gets all the nutrition needed.

Infants at ≥ 34–36 weeks' gestational age can usually take all that they need directly from the breast.

Infants who cannot breastfeed

Non-breastfed infants should receive either:

- expressed breast milk (preferably from their own mothers) or donor human milk where safe and affordable milk-banking facilities are available
- formula milk prepared with clean water according to instructions or, if possible, ready-made liquid formula
- If the above are not available, consider animal milk. Dilute cow's milk by adding 50 ml of water to 100 ml of milk, then add 10 g of sugar, with an approved micronutrient supplement. If possible, do not use for premature infants.

Feeding infant with expressed breast milk from a cup

Expressed breast milk is the best choice, in the following amounts:

- *Infants ≥ 2.0 kg:* Give 150 ml/kg daily, divided into eight feeds at 3-h intervals.
- *Infants < 2.0 kg:* See p. 60 for detailed guidance for low-birth-weight infants.
- If the child is too weak to suck but can swallow, feeding can be done with a cup. Feed by naso- or orogastric tube if the child is lethargic or severely anorexic or unable to swallow.

10.1.2 Nutritional management of sick children

The principles for feeding sick infants and young children are:

- Continue breastfeeding.
- Do not withhold food.
- Give frequent, small feeds, every 2–3 h.
- Coax, encourage, and be patient.
- Feed by nasogastric tube if the child is severely anorexic.
- Promote catch-up growth after the appetite returns.

The food provided should be:

- palatable (to the child)
- easily eaten (soft or liquid consistency)
- easily digested
- nutritious: rich in energy and nutrients.

The basic principle of nutritional management is to provide a diet with sufficient energy-producing foods and high-quality proteins. Foods with a high oil or fat content are recommended; up to 30–40% of the total calories can be given as fat. In addition, feeding at frequent intervals is necessary to achieve high energy intake. For sick children, provide multivitamin and mineral supplements.

The child should be encouraged to eat relatively small amounts frequently. If young children are left to feed themselves or have to compete with siblings for food, they may not get enough to eat.

A blocked nose, with dry or thick mucus, may interfere with feeding. Put drops of saline into the nose with a moistened wick to help soften the mucus.

A minority of children who are unable to eat for a number of days (due, e.g. to impaired consciousness in meningitis or respiratory distress in severe

Catch-up meals

The recipes provide 100 kcal and 3 g protein/100 ml. The individual servings contain approximately 200 kcal and 6 g protein. A child should eat seven meals in 24 h.

Recipe 1 (porridge without milk)

Ingredient	To make 1 litre	For one serving
Cereal flour	100 g	20 g
Groundnut or oilseed paste	100 g	20 g
Sugar	50 g	10 g

Make a thick porridge and then stir in the paste and sugar. Make up to 1 litre.

Recipe 2 (porridge with milk, or rice pudding)

Ingredient	To make 1 litre	For one serving
Cereal flour	125 g	25 g
Milk (fresh or long-life whole milk)	600 ml	120 ml
Sugar	75 g	15 g
Oil or margarine	25 g	5 g

Make a thick porridge with milk and just a little water (or use 75 g whole milk powder instead of the 600 ml liquid milk), then add sugar and oil. Make up to 1 litre.

For rice pudding, replace cereal flour with the same amount of rice.

These recipes may have to be supplemented with vitamins and minerals.

Recipe 3 (rice-based meal)

Ingredient	To make 600 g	For one serving
Rice	75 g	25
Lentils (dhal)	50 g	20 g
Pumpkin	75 g	25 g
Green leaves	75 g	25 g
Oil or margarine	25 g	10 g
Water	800 ml	

Put rice, lentils, pumpkin, oil, spices and water in a pot and cook with a lid on. Just before the rice is cooked, add chopped leaves. Cook for a few more minutes.

Recipe 4 (rice-based meal with cooked family foods)

Ingredient	Amount for one serving
Cooked rice	90 g (four and a half big spoons)[a]
Cooked mashed beans, peas or lentils	30 g (one and a half big spoons)
Cooked mashed pumpkin	30 g (one and a half big spoons)
Margarine or oil	10 g (two teaspoons)[b]

Soften the mashed foods with the oil or margarine

Recipe 5 (maize-based meal with family foods)

Ingredient	Amount for one serving
Thick maize porridge (cooked)	140 g (six big spoons)[a]
Groundnut paste	15 g (three teaspoons)[b]
Egg	30 g (one egg)
Green leaves	20 g (handful)

Stir groundnut paste and raw egg into cooked porridge. Cook for a few minutes. Fry onion and tomato for flavour and add leaves. Stir into porridge or serve separately.

[a] Big = 10 ml spoon, rounded
[b] Teaspoon = 5 ml

Chart 16. Feeding recommendations during sickness and health[a]

Up to 6 months of age

- Breastfeed as often as the child wants, day and night, at least eight times in 24 h. Frequent feeding produces more milk.
- If child is < 1 week and is low birth weight, feed at least every 2 to 3 h. Wake the baby for feeding after 3 h.
- Do not give other foods or fluids.
- If the child is > 4 months, appears hungry after breastfeeding and is not gaining weight adequately:
  - Add complementary foods (see below).
  - Give 2–3 tablespoons of these foods once or twice a day after breastfeeding.

6–12 months

- Breastfeed as often as the child wants day and night, at least eight times in 24 h.
- Give adequate servings of locally appropriate nutrient-dense foods, well mashed or finely chopped, increasing gradually (see Table 31 for examples):
  - three times per day if breastfed
  - five times per day if not breastfed, plus 1–2 cups of milk

12 months to 2 years

- Breastfeed as often as the child wants.
- Give a variety of adequate servings of locally appropriate nutrient-dense foods (see Table 31 for examples) or family foods five times a day.
- Offer one or two snacks between meals and continue to encourage and patiently feed the child during meals.

≥ 2 years

- Give family foods at three meals each day. Also, twice a day, give nutritious food between meals (see Table 31 for examples).
- Talk with your child during meals and keep eye contact.

[a] A good daily diet should be adequate in quantity and include an energy-rich food (for example, thick cereal with added oil), meat, fish, eggs or pulses and fruit and vegetables.

Table 31. Examples of local adaptations of feeding recommendations on the mother's card in Bolivia, Indonesia, Nepal, South Africa and the United Republic of Tanzania

Country	6–12 months	1–2 years	≥ 2 years
Bolivia	Cereal gruel, vegetable puree, minced meat or egg yolk, fruit From 9 months: fish, whole egg	Family meals plus additional seasonal fruit, milk-based desserts (custard, milk rice), yoghurt, cheese, milk twice a day	
Indonesia	Adequate amounts of rice porridge with egg, chicken, fish, meat, *tempe*, *tahu*, carrot, spinach, green beans, oil, coconut milk. Also, snacks twice a day between meals, such as green beans, porridge, banana, biscuit, *nagasari*		Adequate amounts of family foods at three meals a day, consisting of rice, side-dishes, vegetables and fruit. Also twice a day, nutritious foods between meals, such as green beans, porridge, banana, biscuit, *nagasari*
Nepal	Adequate servings of (mashed) foods such as rice, lentils (*dhal*), mashed bread (*roti*), biscuits, milk, yoghurt, seasonal fruits (such as banana, guava, mango), vegetables (such as potatoes, carrots, green leafy vegetables, beans), meat, fish and eggs		
South Africa	Porridge with added oil, peanut butter or ground peanuts, margarine and chicken, beans, full-cream milk, fruit and vegetables, mashed avocado or family food	Porridge with added oil, peanut butter or ground peanuts, margarine and chicken, beans, full-cream milk, fruit and vegetables, mashed avocado or banana, tinned fish or family food	Bread and peanut butter, fresh fruit or full cream
United Republic of Tanzania	Thick gruel, mixed food containing milk, mashed foods (rice, potato, *ugali*). Added beans, other legumes, meat, fish or groundnuts. Added greens or fruit such as pawpaw, mango, banana or avocado. Spoonful of extra oil added to food.		Nutritious snacks such as thick enriched *uji*, milk, fruit twice a day

pneumonia) may have to be fed through a nasogastric tube. The risk for aspiration can be reduced if small volumes are given frequently and by ensuring before each feed that the tube is in the stomach.

To supplement the child's nutritional management in hospital, feeding should be increased during convalescence to make up for any lost weight. It is important that the mother or carer offer food to the child more frequently than normal (at least one additional meal a day) after the child's appetite increases.

10.2 Fluid management

The total daily fluid requirement of a child is calculated from the following formula: 100 ml/kg for the first 10 kg, then 50 ml/kg for the next 10 kg, thereafter 25 ml/kg for each subsequent kg. For example, an 8-kg infant receives 8 x 100 ml = 800 ml per day, a 15 kg child (10 x 100) + (5 x 50) = 1250 ml per day.

Table 32. Maintenance fluid requirements

Body weight of child (kg)	Fluid (ml/day)
2	200
4	400
6	600
8	800
10	1000
12	1100
14	1200
16	1300
18	1400
20	1500
22	1550
24	1600
26	1650

Give the sick child more than the above amounts if he or she has fever (increase by 10% for every 1 °C of fever).

Monitoring fluid intake

Pay careful attention to maintaining adequate hydration in very sick children, who may have had no oral fluid intake for some time. ***Fluids should preferably be given orally (by mouth or nasogastric tube)***.

If fluids have to be given IV, it is important to monitor infusion closely because of the risk for fluid overload, which can lead to heart failure or cerebral oedema.

If it is impossible to monitor the IV fluid infusion closely, the IV route should be used only for the management of severe dehydration, septic shock, delivering IV antibiotics and for children for whom oral fluids are contraindicated (such as those with perforation of the intestine or other surgical abdominal problems). Possible IV maintenance fluids include half-normal saline plus 5% or 10% glucose. Do not give 5% glucose alone as this can lead to hyponatraemia. See Annex 4, p. 377 for composition of IV fluids.

10.3 Management of fever

The temperatures given in these guidelines are **rectal temperatures**, unless otherwise stated. Oral and axillary temperatures are lower by approximately 0.5 °C and 0.8 °C, respectively.

Fever is not an indication for antibiotic treatment and may help the immune defence against infection. High fever (> 39 °C or > 102.2 °F) can have harmful effects, such as:

- reducing the appetite
- making the child irritable
- precipitating convulsions in some children aged 6 months to 5 years
- increasing oxygen consumption (e.g. in a child with very severe pneumonia, heart failure or meningitis).

All children with fever should be examined for signs and symptoms that indicate the underlying cause of the fever, and should be treated accordingly (see Chapter 6, p. 149).

Antipyretic treatment

Paracetamol

Treatment with oral paracetamol should be restricted to children aged ≥ 2 months who have a fever of ≥ 39 °C (≥ 102.2 °F) and are uncomfortable or distressed because of the high fever. Children who are alert and active are unlikely to benefit from paracetamol.

▶ Paracetamol dose is 15 mg/kg every 6 h.

Ibuprofen

The effectiveness in lowering temperature and the safety of ibuprofen and acetaminophen are comparable, except that ibuprofen, like any NSAID, can cause gastritis and is slightly more expensive.

▶ Ibuprofen dose is 10 mg/kg every 6–8 h.

Other agents

Aspirin is not recommended as a first-line antipyretic because it has been linked with Reye syndrome, a rare but serious condition affecting the liver and brain. Avoid giving aspirin to children with chickenpox, dengue fever and other haemorrhagic disorders.

Other agents are not recommended because of their toxicity and inefficacy (dipyrone, phenylbutazone).

Supportive care

Children with fever should be lightly clothed, kept in a warm but well-ventilated room, and encouraged to increase their oral fluid intake.

10.4 Pain control

Correct use of analgesics will relieve pain in most children with pain due to medical illness, when given as follows:

- Give analgesics in two steps according to whether the pain is mild or moderate-to-severe.
- Give analgesics regularly ('by the clock'), so that the child does not have to experience recurrence of severe pain in order to obtain another dose of analgesic.
- Administer by the most appropriate, simplest, most effective and least painful route, by mouth when possible (IM treatment can be painful and, if shock is present, can delay the effect).
- Tailor the dose for each child, because children have different dose requirements for the same effect, and progressively titrate the dose to ensure adequate pain relief.

Use the following drugs for effective pain control:

Mild pain: such as headaches, post-traumatic pain and pain due to spasticity

▶ Give paracetamol or ibuprofen to children > 3 months who can take oral medication. For infants < 3 months of age, use only paracetamol.

  – paracetamol at 10–15 mg/kg every 4–6 h

  – ibuprofen at 5–10 mg/kg every 6–8 h

Moderate-to-severe pain and pain that does not respond to the above treatment: strong opioids:

■ Give morphine orally or IV every 4–6 h or by continuous IV infusion

- If morphine does not adequately relieve pain, then switch to alternative opioids, such as fentanyl or hydromorphone.

Note: *Monitor carefully for respiratory depression. If tolerance develops, the dose should be increased to maintain the same degree of pain relief.*

Adjuvant medicines: There is no sufficient evidence that adjuvant therapy relieves persistent pain or specific cases such as neuropathic pain, bone pain and pain associated with muscle spasm in children. Commonly used drugs include diazepam for muscle spasm, carbamazepine for neuralgic pain and corticosteroids (such as dexamethasone) for pain due to an inflammatory swelling pressing on a nerve.

Pain control for procedures:

Local anaesthetics: for painful lesions in the skin or mucosa or during painful procedures (lidocaine inflitrated at 1–2%)

- lidocaine: apply (with gloves) on a gauze pad to painful mouth ulcers before feeds; acts within 2–5 min
- tetracaine, adrenaline and cocaine: apply to a gauze pad and place over open wounds; particularly useful during suturing

10.5 Management of anaemia

Non-severe anaemia

Young children (aged < 6 years) are anaemic if their Hb is < 9.3 g/dl (approximately equivalent to an EVF of < 27%). If anaemia is present, begin treatment, unless the child has severe acute malnutrition, in which case see p. 218.

- Give (home) treatment with iron (daily iron–folate tablet or dose of iron syrup) for 14 days.
- Ask the parent to return with the child in 14 days. Treat for 3 months when possible, as it takes 2–4 weeks to correct anaemia and 1–3 months to build up iron stores.
- If the child is ≥ 1 year and has not received mebendazole in the previous 6 months, give one dose of mebendazole (500 mg) for possible hookworm or whipworm infestation.
- Advise the mother about good feeding practice.

Severe anaemia

▶ Give a blood transfusion as soon as possible (see below) to:

- all children with an EVF of ≤ 12% or Hb of ≤ 4 g/dl
- less severely anaemic children (EVF, 13–18%; Hb, 4–6 g/dl) with any of the following clinical features:
  - clinically detectable dehydration
  - shock
  - impaired consciousness
  - heart failure
  - deep, laboured breathing
  - very high malaria parasitaemia (> 10% of red cells with parasites).

- If packed cells are available, give 10 ml/kg over 3–4 h in preference to whole blood. If not available, give fresh whole blood (20 ml/kg) over 3–4 h.
- Check the respiratory rate and pulse rate every 15 min. If either rises or there is other evidence of heart failure, such as basal lung crepitations, enlarged liver or raised jugular venous pressure, transfuse more slowly. If there is any evidence of fluid overload due to the blood transfusion, give IV furosemide at 1–2 mg/kg, up to a maximum total of 20 mg.
- After the transfusion, if the Hb remains as low as before, repeat the transfusion.
- In children with severe acute malnutrition, fluid overload is a common and serious complication. Give packed cells when available or whole blood at 10 ml/kg (rather than 20 ml/kg), and do not repeat transfusion based on the Hb level, or within 4 days of transfusion(see p. 218).

10.6 Blood transfusion

10.6.1 Storage of blood

Use blood that has been screened and found negative for transfusion-transmissible infections. Do not use blood that has passed its expiry date or has been out of the refrigerator for more than 2 h.

Large-volume, rapid transfusion at a rate > 15 ml/kg per h of blood stored at 4 °C may cause hypothermia, especially in small infants.

10.6.2 Problems in blood transfusion

Blood can be the vehicle for transmitting infections (e.g. malaria, syphilis, hepatitis B and C, HIV). Therefore, screen donors for as many of these infections as possible. To minimize the risk, give blood transfusions only when essential.

10.6.3 Indications for blood transfusion

There are five general indications for blood transfusion:

- acute blood loss, when 20–30% of the total blood volume has been lost, and bleeding is continuing
- severe anaemia
- septic shock (if IV fluids are insufficient to maintain adequate circulation; transfusion to be given in addition to antibiotic therapy)
- whole fresh blood is required to provide plasma and platelets for clotting factors, if specific blood components are not available
- exchange transfusion in neonates with severe jaundice.

10.6.4 Giving a blood transfusion

Before transfusion, check that:

- the blood is the correct group, and the patient's name and number are on both the label and the form (in an emergency, reduce the risk for incompatibility or transfusion reactions by cross-matching group-specific blood or giving O-negative blood if available)
- the blood transfusion bag has no leaks
- the blood pack has not been out of the refrigerator for more than 2 h, the plasma is not pink or has large clots, and the red cells do not look purple or black
- the child has no signs of heart failure. If present, give 1 mg/kg of furosemide IV at the start of the transfusion to children whose circulating blood volume is normal. Do not inject into the blood pack.

Make baseline recordings of the child's temperature, respiratory rate and pulse rate.

The volume of whole blood transfused should initially be 20 ml/kg, given over 3–4 h.

During transfusion:

- If available, use an infusion device to control the rate of transfusion.
- Check that the blood is flowing at the correct speed.
- Look for signs of a transfusion reaction (see below), particularly carefully in the first 15 min of transfusion.
- Record the child's general appearance, temperature, pulse and respiratory rate every 30 min.

Giving a blood transfusion.
Note: A burette is used to measure the blood volume, and the arm is splinted to prevent flexion of the elbow.

- Record the times the transfusion was started and ended, the volume of blood transfused and any reactions.

After transfusion:

- Reassess the child. If more blood is needed, a similar quantity should be transfused and the dose of furosemide (if given) repeated.

10.6.5 Transfusion reactions

If a transfusion reaction occurs, first check the blood pack labels and the patient's identity. If there is any discrepancy, stop the transfusion immediately and notify the blood bank.

Mild reaction (due to mild hypersensitivity)

Signs and symptoms:

- itchy rash

Management

- Slow the transfusion.
- Give chlorphenamine at 0.1 mg/kg IM, if available.
- Continue the transfusion at the normal rate if there is no progression of symptoms after 30 min.
- If the symptoms persist, treat as a moderately severe reaction (see below).

Moderately severe reaction (due to moderate hypersensitivity, non-haemolytic reactions, pyrogens or bacterial contamination)

Signs and symptoms:

- severe itchy rash (urticaria)
- flushing
- fever > 38 °C (> 100.4 °F) (***Note:*** *Fever may have been present before the transfusion.*)
- rigor
- restlessness
- raised heart rate

Management

- Stop the transfusion, remove the IV line but not the cannula. Set up a new infusion with normal saline.
- Give 200 mg hydrocortisone IV or 0.25 mg/kg chlorphenamine IM, if available.
- Give a bronchodilator if wheezing (see pp. 103–4).
- Send the following to the blood bank: the blood-giving set that was used, a blood sample from another body site and urine samples collected over 24 h.
- If there is improvement, restart the transfusion slowly with new blood and observe carefully.
- If there is no improvement in 15 min, treat as a life-threatening reaction (see below), and report to the doctor in charge and to the blood bank.

Life-threatening reaction (due to haemolysis, bacterial contamination and septic shock, fluid overload or anaphylaxis)

Signs and symptoms

- fever > 38 °C (> 100.4 °F) (***Note:*** *Fever may have been present before the transfusion.*)
- rigor
- restlessness
- raised heart rate
- fast breathing
- black or dark-red urine (haemoglobinuria)
- unexplained bleeding
- confusion
- collapse

Note that in an unconscious child, uncontrolled bleeding or shock may be the only signs of a life-threatening reaction.

Management

- Stop the transfusion, take out the IV line, but keep in the cannula. Set up an IV infusion with normal saline.
- Maintain airway and give oxygen (see p. 11).
- Give adrenaline 0.15 ml of 1:1000 solution IM.
- Treat shock (see p. 13).
- Give 200 mg hydrocortisone IV or chlorphenamine 0.1 mg/kg IM, if available.
- Give a bronchodilator, if there is wheezing (see pp. 98–9).
- Report to the doctor in charge and to the blood laboratory as soon as possible.
- Maintain renal blood flow with IV furosemide at 1 mg/kg.
- Give antibiotics as for septicaemia (see p. 179).

10.7 Oxygen therapy

Indications

Oxygen therapy should be guided by pulse oximetry (see p. 315). Give oxygen to children with an oxygen saturation < 90%. When a pulse oximeter is not available, the necessity for oxygen therapy should be guided by clinical signs,

although they are less reliable. Oxygen should be given to children with very severe pneumonia, bronchiolitis or asthma who have:

- central cyanosis
- inability to drink (when this is due to respiratory distress)
- severe lower chest wall indrawing
- respiratory rate ≥ 70/min
- grunting with every breath (in young infants)
- depressed mental status.

Sources

Oxygen should be available at all times. The two main sources of oxygen are cylinders and oxygen concentrators. It is important that all equipment is checked for compatibility.

Oxygen cylinders and concentrators

See list of recommended equipment for use with oxygen cylinders and concentrators and instructions for their use in the WHO manuals on clinical use of oxygen therapy and on oxygen systems.

Oxygen delivery

Nasal prongs are the preferred method of delivery in most circumstances, as they are safe, non-invasive, reliable and do not obstruct the nasal airway. Nasal or nasopharyngeal catheters may be used as an alternative only when nasal prongs are not available. The use of headboxes is not recommended. Face masks with a reservoir attached to deliver 100% oxygen may be used for resuscitation.

Oxygen therapy: Nasal prongs correctly positioned and secured

Nasal prongs. These are short tubes inserted into the nostrils. Place them just inside the nostrils, and secure with a piece of

tape on the cheeks near the nose (see figure). Care should be taken to keep the nostrils clear of mucus, which could block the flow of oxygen.

- Set a flow rate of 1–2 litres/min (0.5 litre/min for young infants) to deliver an inspired oxygen concentration of up to 40%. Humidification is not required with nasal prongs.

Nasal catheter: a 6 or 8 French gauge catheter that is passed to the back of the nasal cavity. Insert the catheter at a distance equal to that from the side of the nostril to the inner margin of the eyebrow.

- Set a flow rate of 1–2 litres/min. Humidification is not required.

Nasopharyngeal catheter. A 6 or 8 French gauge catheter is passed to the pharynx just below the level of the uvula. Insert the catheter at a distance equal to that from the side of the nostril to the front of the ear (see figure). If it is placed too far down, gagging and vomiting and, rarely, gastric distension can occur.

- Set a flow rate of 1–2 litres/min to avoid gastric distension. Humidification is required.

Monitoring

Train nurses to place and secure the nasal prongs correctly. Check regularly that the equipment is working properly, and remove and clean the prongs at least twice a day.

Monitor the child at least every 3 h to identify and correct any problems, including:

- oxygen saturation, by pulse oximeter
- position of nasal prongs
- leaks in the oxygen delivery system
- correct oxygen flow rate
- airway obstructed by mucus (clear the nose with a moist wick or by gentle suction)

Pulse oximetry

Normal oxygen saturation at sea level in a child is 95–100%; in children with severe pneumonia, this usually decreases. Oxygen should be given if saturation drops to < 90% (measured at room air). Different cut-offs might be used at altitude or if oxygen is scarce. The response to oxygen therapy can also be measured with a pulse oximeter, as the oxygen saturation should increase if the child has lung disease (with cyanotic heart disease, oxygen saturation does not change when oxygen is given). The oxygen flow can be titrated with the pulse oximeter to obtain a stable oxygen saturation > 90% without wasting too much oxygen.

Duration of oxygen therapy

Continue giving oxygen continuously until the child is able to maintain an oxygen saturation > 90% in room air. When the child is stable and improving, take the child off oxygen for a few minutes. If the oxygen saturation remains > 90%, discontinue oxygen, but check again half an hour later and every 3 h thereafter on the first day off oxygen to ensure that the child is stable. When pulse oximetry is not available, the duration of oxygen therapy is guided by clinical signs (see p. 313), which are less reliable.

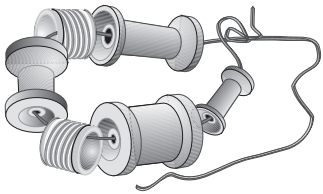
10.8 Toys and play therapy

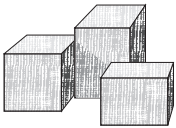
Each play session should include language and motor activities and activities with toys. Teach the child local songs. Encourage the child to laugh, vocalize and describe what he or she is doing. Always encourage the child to perform the next appropriate motor activity.

Activities with toys

Ring on a string (from 6 months)

Thread cotton reels and other small objects (e.g. cut from the neck of plastic bottles) onto a string. Tie the string in a ring, leaving a long piece of string hanging.





Blocks (from 9 months)

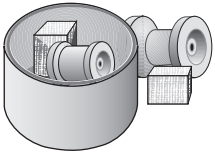
Smooth the surfaces of small blocks of wood with sandpaper and paint in bright colours, if possible.

Nesting toys (from 9 months)

Cut off the bottoms of two bottles of identical shape but different size, and place the smaller bottle inside the larger bottle.

In-and-out toy (from 9 months)

Any plastic or cardboard container and small objects (not small enough to be swallowed)



Rattle (from 12 months)

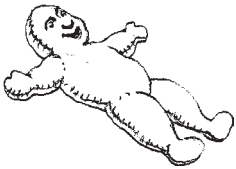
Cut long strips of plastic from coloured plastic bottles. Place them in a small transparent plastic bottle, and glue the top on firmly.

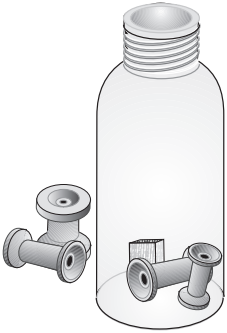
Drum (from 12 months)

Any tin with a tightly fitting lid

Doll (from 12 months)

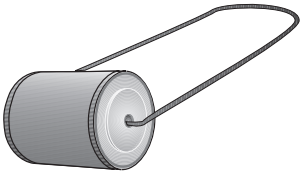
Cut out two doll shapes from a piece of cloth and sew the edges together, leaving a small opening. Turn the doll inside-out, and stuff with scraps of materials. Stitch up the opening and sew or draw a face on the doll.





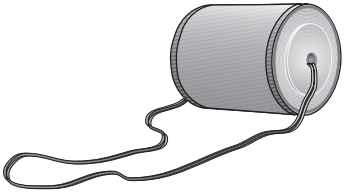
Posting bottle (from 12 months)

Take a large transparent plastic bottle with a small neck, and place small long objects that fit through the neck (not small enough to be swallowed).



Push-along toy (from 12 months)

Make a hole in the centre of the base and lid of a cylindrical tin. Thread a piece of wire (about 60 cm long) through each hole, and tie the ends inside the tin. Put some metal bottle tops inside the tin and close the lid.



Pull-along toy (from 12 months)

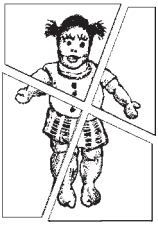
As above, except that string is used instead of wire.

Stacking bottle tops (from 12 months)

Cut at least three identical round plastic bottles in half and stack them.

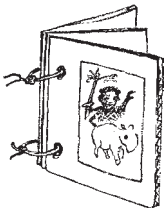
Mirror (from 18 months)

A tin lid with no sharp edges



Puzzle (from 18 months)

Draw a figure (e.g. a doll) with a crayon on a square or rectangular piece of cardboard. Cut the figure in half or quarters.



Book (from 18 months)

Cut out three rectangular pieces of the same size from a cardboard box. Glue or draw a picture on both sides of each piece. Make two holes down one side of each piece and thread string through to make a book.

Notes

CHAPTER 11

Monitoring the child's progress

11.1 Monitoring procedures

In order for monitoring to be effective, the health worker must know:

- the correct administration of the treatment
- the expected progress of the child
- the possible adverse effects of the treatment
- the complications that may arise and how they can be identified
- possible alternative diagnoses in a child who is not responding to treatment.

Children treated in hospital should be checked regularly, so that any deterioration in their condition or complications, adverse effects of treatment or errors in the administration of treatment can be identified promptly. The frequency of monitoring depends on the severity and nature of the illness (see relevant sections in chapters 3–8).

Details of the child's condition and progress should be recorded, so that they can be reviewed by other members of staff. A senior health worker who is responsible for the care of the child and has the authority to change treatment should supervise the records and examine the child regularly.

Children who are seriously ill should be visited by a doctor (or other senior health professional) soon after admission to hospital. These visits should be seen as an opportunity to encourage communication between the families of sick children and hospital staff.

11.2 Monitoring chart

A monitoring chart should include the following items.

- patient's details
- vital signs (indicated by pulse rate and volume, respiratory rate and presence of lower chest indrawing, coma score or level of consciousness [AVPU], temperature and body weight)
- fluid balance (urine output, any vomiting, any stool)
- presence of clinical signs, complications and positive findings of investigations. At each review of the child, record whether these signs are still present. Record any new signs or complications.
- treatments given
- feeding and nutrition. Record the child's weight on admission and at appropriate intervals during treatment. There should be a daily record of the child's drinking, breastfeeding and eating. Record the amount of food taken and details of any feeding problems.

See Annex 6 (p. 403) for references to examples of monitoring charts and critical care pathways.

11.3 Audit of paediatric care

The quality of care given to sick children in hospital can be improved if there is a system for reviewing the outcomes of each child admitted to the hospital. At a minimum, the system should keep records of all children who died in the hospital. Trends in case fatality rates over time can then be compared, and the treatment given can be discussed by all staff with the aim of identifying any problems and finding solutions. Clinical audit meetings to discuss near-death events or deaths in children, especially those in which some aspect of treatment might have gone wrong, can also be helpful. The aim is to improve care and solve problems, not to attribute blame for errors.

An audit of hospital paediatric care can be carried out by comparing the quality of care actually given with a recognized standard, such as the WHO recommendations contained in this *Pocket book*. A successful audit calls for full, constructive participation of all medical and nursing staff. The audit should be simple and not take up too much of the time required for caring for sick children. One suggestion is to ask medical and nursing staff for their views on improving the quality of care and to give priority to the conditions or problems they identify.

CHAPTER 12

Counselling and discharge from hospital

The discharge process of all children should include:

- correct timing of discharge from hospital
- counselling the mother on treatment and feeding the child at home
- ensuring that the child's vaccination status and record card are up to date
- communicating with the health worker who referred the child or who will be responsible for follow-up care
- giving instructions on when to return to hospital for follow-up and on symptoms and signs indicating the need to return urgently
- assisting the family with special support, e.g. providing equipment for a child with a disability or linking with community support organizations for children with HIV/AIDS.

12.1 Timing of discharge from hospital

In general, in the management of acute infections, a child can be considered ready for discharge after the clinical condition has improved markedly (afebrile, alert, eating and sleeping normally), and oral treatment has been started.

A decision on when to discharge should be made on an individual basis, taking into consideration factors such as:

- the family's home circumstances and how much support is available to care for the child
- the staff's judgement of the likelihood that the treatment course will be completed at home
- the staff's judgement of the likelihood that the family will return immediately to hospital if the child's condition worsens.

The timing of discharge of a child with severe acute malnutrition is particularly important and is discussed in Chapter 7, p. 219. In each case, the family should be given as much warning as possible of the discharge date, so that appropriate arrangements can be made to support the child at home.

If the family removes the child prematurely against the advice of the hospital staff, counsel the mother on how to continue treatment at home, and encourage her to bring the child for follow-up after 1–2 days and to make contact with the local health worker for help in the follow-up care of the child.

12.2 Counselling

Mother's card

A simple, pictorial card reminding the mother of home care instructions, when to return for follow-up care and the signs indicating the need to return immediately to the hospital can be given to each mother. This card will help her to remember the appropriate foods and fluids and when to return to the health worker.

Appropriate cards should be available as part of national IMCI guidelines. If they are available, use them; if not, see Annex 6 for a reference to an example.

When reviewing the mother's card with the mother:

- Hold the card so that she can easily see the pictures, or allow her to hold it herself.
- Point to the pictures as you talk, and explain each one; this will help her to remember what the pictures represent.
- Mark the information that is relevant to the mother. For example, put circles around the feeding advice for the child's age and around the signs to return immediately. If the child has diarrhoea, tick the appropriate fluid(s) to be given. Record the date for the next vaccination.
- Watch to see if the mother looks worried or puzzled. If so, encourage questions.
- Ask the mother to tell you in her own words what she should do at home. Encourage her to use the card to help her remember.

- Give her the card to take home. Suggest that she show it to other family members. (If you do not have a large enough supply of cards to give to every mother, keep several in the clinic to show to mothers.)
- Provide an effective interpreter if language is a barrier.

12.3 Nutrition counselling

For HIV counselling, see p. 243.

Identifying feeding problems

First, identify any feeding problems that have not been fully resolved.

Ask the following questions:

- ***Do you breastfeed your child?***
  - How many times during the day?
  - Do you also breastfeed during the night?
- ***Does the child take any other food or fluids?***
  - What food or fluids?
  - How many times a day?
  - What do you use to feed the child?
  - How large are the servings?
  - Does the child receive his or her own serving?
  - Who feeds the child and how?

Compare the child's actual feeding with the recommended guidelines for feeding a child of that age (see section 10.1.2, p. 299). Identify any differences, and list these as feeding problems.

In addition, consider:

- ***Difficulty in breastfeeding***
- ***Lack of active feeding***
- ***Not feeding well during the illness***

Advise the mother how to overcome the problems and how to feed the child.

Refer to local feeding recommendations for children of different ages. These recommendations should include details of locally appropriate energy-rich and nutrient-rich complementary foods.

Even when specific feeding problems are not found, praise the mother for what she does well. Give her advice that promotes:

- breastfeeding
- improved complementary feeding practices with locally available energy- and nutrient-rich foods
- giving nutritious snacks to children aged ≥ 2 years.

Examples of nutritionally adequate diets (see Chart 15, p. 106 in the WHO manual *Management of the child with a serious infection or severe malnutrition* could be printed on the reverse of a locally adapted mother's card.

12.4 Home treatment

- Use words the mother understands.
- Use teaching aids that are familiar (e.g. common containers for mixing ORS).
- Allow the mother to practise what she must do, e.g. preparing ORS solution or giving an oral medication, and encourage her to ask questions.
- Give advice in a helpful, constructive manner, praising the mother for correct answers or good practice.
- Teaching mothers is not just giving instructions. It should include:
  - ***Give information***. Explain to the mother how to give treatment, e.g. preparing ORS, giving an oral antibiotic or applying eye ointment.
  - ***Show an example***. Demonstrate to the mother how to give the treatment.
  - ***Let her practice***. Ask the mother to prepare the medicine or give the treatment while you watch. Help her as needed, so that she does it correctly.
  - ***Check her understanding***. Ask the mother to repeat the instructions in her own words, or ask her questions to see that she has understood correctly.

12.5 Checking the mother's health

If the mother is sick, provide treatment for her, and help to arrange follow-up at a first-level clinic close to her home. Check the mother's nutritional status, and give any appropriate counselling. Check the mother's immunization status, and, if needed, give her tetanus toxoid. Make sure the mother has access to family planning and birth spacing and counselling about preventing sexually transmitted and HIV infections. If the child has TB, the mother and other members of the family should have a chest X-ray and a Mantoux test. Make sure the mother knows where to have them, and explain why they are needed.

12.6 Checking immunization status

Ask to see the child's immunization card, and determine whether all the vaccinations recommended for the child's age have been given. Note any vaccinations the child still needs, and explain this to the mother. Give the vaccinations before the child leaves hospital, and record them on the card.

Recommended vaccination schedule

Table 33 below lists WHO's international recommendations. National recommendations take account of local disease patterns.

Contraindications

It is important to vaccinate all children, including those who are sick and malnourished, unless there are contraindications. There are **only three contraindications** to vaccination:

- Do not give BCG or yellow fever vaccine to a child with **symptomatic** HIV infection or AIDS, but do give the other vaccines.
- Do not give DPT-2 or -3 to a child who has had convulsions or shock within 3 days of the most recent dose.
- Do not give DPT to a child with recurrent convulsions or an active disease of the central nervous system.

A child with diarrhoea who is due to receive oral polio vaccine should be given a dose, but this dose should not be counted in the schedule. Make a note on the child's immunization record that it coincided with diarrhoea, so that the health worker will give the child an extra dose.

12.7 Communicating with the first-level health worker

The first-level health worker who referred the child to hospital should receive information about the child's care in hospital, which should include:

- diagnosis or diagnoses
- treatment(s) given and duration of stay in hospital
- response of the child to treatment
- instructions given to the mother for follow-up treatment or other care at home
- other matters for follow-up (e.g. vaccinations).

If the child has a health card, the above information can be recorded on it, and the mother should be asked to show it to the health worker. When there is no health card, these details should be recorded in a short note for the mother and health worker.

Table 33. Primary vaccination schedule for infants recommended in the Expanded Programme of Immunization

Vaccine		Age				
		Birth	**6 weeks**	**10 weeks**	**14 weeks**	**9 months**
BCG		x				
Polio	Oral polio vaccine	x[a]	x	x	x	
	Inactivated polio vaccine		8 weeks		x	5 months
DPT			x	x	x	
Hepatitis B	Option 1[b]	x	x		x	
	Option 2[b]	x	x	x	x	
H. influenzae type b		x	x	x		
Pneumococcal	Option 1		x	x	x	
	Option 2		x		x	x
Rotavirus	Rotarix		x	x		
	Rota Teq		x	x	x	
Yellow fever						x[c]
Measles						x[d]
Rubella						x

[a] In polio-endemic countries

[b] Option 1 is recommended in areas where perinatal transmission of hepatitis B virus is frequent (e.g. in South-East Asia). Option 2 may be used in areas where perinatal transmission is less frequent (e.g. in sub-Saharan Africa).

[c] In countries where yellow fever poses a risk

[d] In exceptional situations, where measles morbidity and mortality in infants < 9 months of age represent more than 15% of cases and deaths, give an extra dose of measles vaccine at 6 months of age. The scheduled dose should also be given as soon as possible after 9 months of age. The extra measles dose is also recommended for groups at high risk for death from measles, such as infants in refugee camps, infants admitted to hospitals, HIV-positive infants and infants affected by disasters and during outbreaks of measles.
A second opportunity to receive a dose of measles vaccine should be provided for all children. This may be done either as part of the routine schedule or in a campaign.

12.8 Providing follow-up care

Advise all mothers who are taking their children home after assessment in the hospital when to go to a health worker for follow-up care. Mothers may need to return to hospital:

- for a follow-up visit within a specified number of days (e.g. when it is necessary to check progress or the response to an antibiotic)
- if signs appear that suggest that the illness or injury (e.g. head injury) is worsening
- for the child's next vaccination.

It is especially important to teach the mother the signs that indicate the need to return to hospital immediately. Guidance on the follow-up of specific clinical conditions is given in appropriate sections of this *Pocket book*.

Follow-up for feeding and nutritional problems

- If a child has a feeding problem and changes in feeding have been recommended, follow up in 5 days to see whether the mother has made the changes, and give further counselling if needed.
- If the child has anaemia, follow up in 14 days to give more oral iron.
- If the child has a very low weight, additional follow-up is needed in 30 days, which involves weighing the child, reassessing feeding practices and giving further nutritional counselling.

When to return immediately

Advise the mother to return immediately if the child develops any of the following signs:

- unable to drink or breastfeed
- becomes sicker
- develops a fever
- signs of illness return after successful treatment in hospital
- a cough or cold: fast or difficult breathing
- diarrhoea: blood in stool or drinking poorly.

Next 'well-child' visit

Remind the mother about the child's next visit for vaccination, and record the date on the mother's card or the child's immunization record.

Notes

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This *Pocket book* was updated on the basis of recommendations and guidelines derived from published guidelines that are regularly reviewed and updated by the Guidelines Review Committee. These can be accessed on the WHO website at **http://www.who.int/maternal_child_adolescent/en/**. The second edition of the *Pocket book* has been revised to be consistent with current WHO guidelines and recommendations as of June 2012.

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ANNEX 1

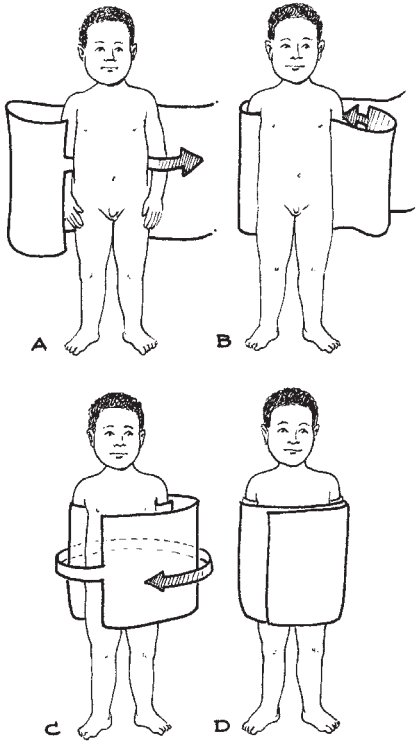
Practical procedures

Practical procedures should first be explained to the parents or to the child if she or he is old enough; any risks should also be discussed with them and their consent obtained. Procedures on young infants should be carried out in warm surroundings to avoid hypothermia. Good light is essential. Older children should be told what is to happen. Analgesia should be given when necessary.

Analgesia and sedation for procedures

For some procedures (e.g. chest tube insertion or femoral cannulation), sedation with diazepam or light anaesthesia with ketamine should be considered (see section 9.1.2, p. 258).

For diazepam sedation, give 0.1–0.2 mg/kg IV. For ketamine, give 2–4 mg/kg IM; this takes 5–10 min to act and lasts for about 20 min.



Wrapping the child to hold him or her securely during a practical procedure

One end of a folded sheet should be pulled through under the arms on both sides (A and B). The other end is then brought across the front and wrapped around the child (C and D).

Restraining the child for examination of eyes, ears or mouth

When giving any sedation or light anaesthesia, manage the child's airway, beware of respiratory depression, and monitor oxygen saturation with a pulse oximeter, when possible. **Make sure** you have a resuscitation bag available and, if possible, oxygen.

A1.1 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.

A1.1.1 Intramuscular

In children aged > 2 years, give the injection into the outer thigh or the upper, outer quadrant of the buttock, well away from the sciatic nerve. In younger or severely malnourished children, use the outer side of the thigh midway between the hip and the knee or over the deltoid muscle in the upper arm. Push the needle (23–25-gauge) into the muscle at a 90° angle (45° angle in the thigh). Draw back the plunger to make sure there is no blood (if there is, withdraw slightly and try again). Give the drug by pushing the plunger slowly until the end. Remove the needle, and press a small swab or cotton-wool firmly over the injection site.

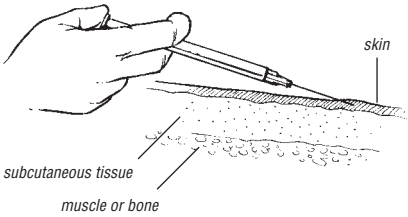
Intramuscular injection into the thigh

A1.1.2 Subcutaneous

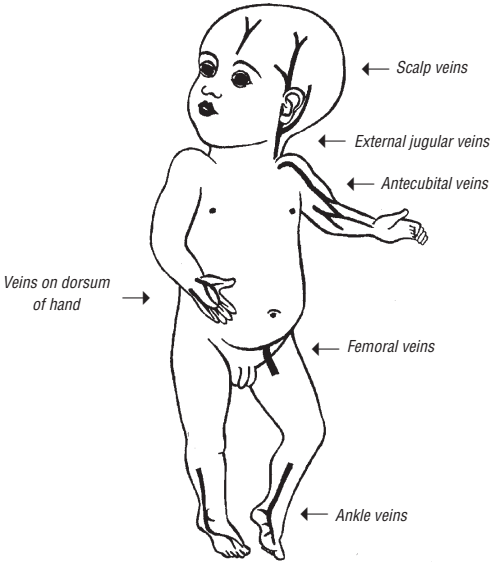
Select the site as described above for intramuscular injection. Push the needle (23–25-gauge) under the skin at a 45° angle into the subcutaneous fatty tissue. Do not enter the underlying muscle. Draw back the plunger to make sure there is no blood (if there is, withdraw slightly and try again). Give the drug by pushing the plunger slowly until the end. Remove the needle and press cotton-wool firmly over the injection site.

A1.1.3 Intradermal

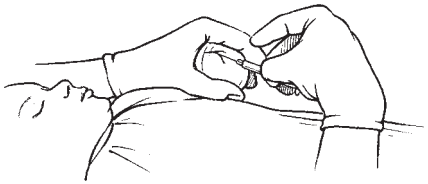
For an intradermal injection, select an undamaged, uninfected area of skin (e.g. over the deltoid in the upper arm). Stretch the skin between the thumb and forefinger of one hand; with the other, slowly insert the needle (25 gauge), bevel upwards, about 2 mm just under and almost parallel to the surface 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 Mantoux test)



Sites for IV access in infants and young children



Inserting an IV cannula into a vein on the back of the hand. The hand is bent to obstruct venous return and thus make the veins visible.

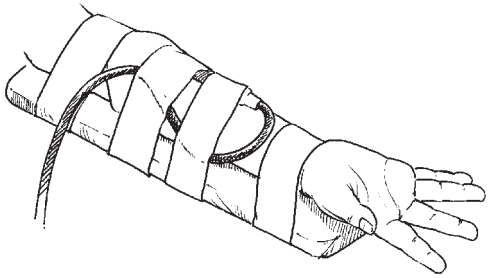
A1.2 Giving parenteral fluids

A1.2.1 Insertion of an indwelling intravenous cannula in a peripheral vein

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.
- An assistant should keep the position of the limb steady and should 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 (such as spirit, iodine, isopropyl alcohol or 70% alcohol solution), then introduce the cannula into



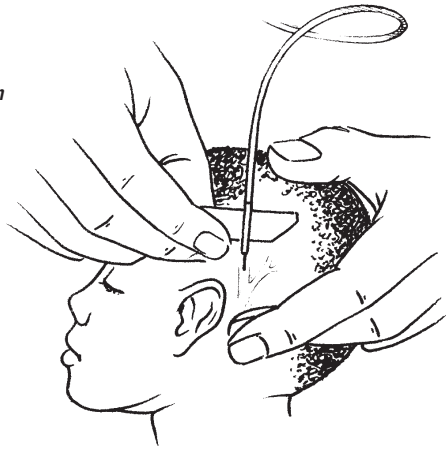
Splinted arm for IV infusion to prevent bending of the elbow

the vein and insert most of its length. Fix the catheter securely with tape. Apply a splint with the limb in an appropriate position (e.g. elbow extended, wrist slightly flexed).

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 proximal to the site of puncture. 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.
- 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.



Inserting a butterfly needle into a scalp vein to set up an IV infusion in a young infant

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.

Common complications

Superficial infection of the skin at the cannula site is the commonest complication. The infection may lead to thrombophlebitis, which will occlude the vein and result in fever. The surrounding skin is red and tender. Remove the cannula to reduce the risk of further spread of the infection. Apply a warm, moist compress to the site for 30 min every 6 h. If fever persists for more than 24 h, antibiotic treatment (effective against *Staphylococcus aureus*) should be given.

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 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
- **or** use a central vein
- **or** perform a venous cut-down.

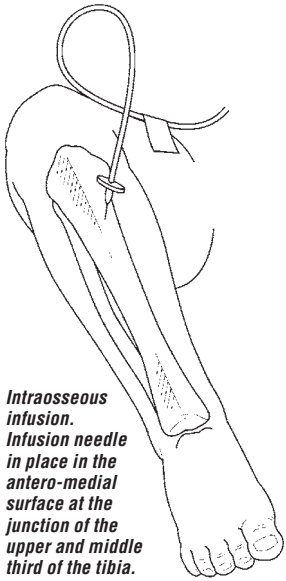
A1.2.2 Intraosseous infusion

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 antero-medial 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.

- Prepare the necessary equipment, i.e.:
  - 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
  - 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 above and shown opposite).
- Wash the hands and put on sterile gloves.
- Clean the skin over and surrounding 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.



Intraosseous infusion. Infusion needle in place in the antero-medial surface at the junction of the upper and middle third of the tibia.

- 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.
- 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 its place.
- ***Note:*** *Failure to aspirate marrow contents does not mean that the needle is not correctly placed.*

- Monitor the infusion by the ease with which the fluid flows and by the clinical response of the patient.
- 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, it should not continue for more than 8 h.

Complications include:

- Incomplete penetration of the bony cortex
  Signs: The needle is not well fixed; infiltration occurs under the skin.
- Penetration of the posterior bone cortex (more common)
  Signs: Infiltration occurs, calf becomes tense.
- Infection
  Signs: Cellulitis at the site of the infusion.

A1.2.3 Central vein cannulation

This should not be used routinely; only when IV access is urgent. Remove the cannula from a central vein as soon as possible (i.e. when IV fluid is no longer essential or when a peripheral vein can be cannulated successfully).

External jugular vein

- Hold the child securely, with the head turned to one side away from the puncture site and slightly lower than the body (15–30° head-down position). Restrain the child as necessary in this position.
- After cleaning the skin with an antiseptic solution, identify the external jugular vein as it passes over the sternocleidomastoid muscle at the junction of its middle and lower thirds. An assistant should occlude the vein to keep it distended and keep its position steady by pressing over the lower end of the visible part of the vein just above the clavicle. Pierce the skin over the vein, pointing in the direction of the clavicle. A short firm thrust will push the needle into the vein. Proceed with cannulation of the vein, as described above for a peripheral vein.

Femoral vein

- The child should be supine with the buttocks elevated 5 cm on a rolled-up towel so that the hip is slightly extended. Abduct and externally rotate the hip joint, and flex the knee. An assistant should hold the leg in this position and keep the other leg out of the way. If the child is conscious, infiltrate the area with 1% lignocaine.

- Clean the skin with an antiseptic solution to ensure that the procedure is aseptic. Palpate the femoral artery (below the inguinal ligament in the middle of the femoral triangle). The femoral vein runs medial to the femoral artery.
- Clean the skin with antiseptic. Introduce the needle at 10–20° to the skin, 1–2 cm distal to the inguinal ligament, 0.5–1 cm medial to the femoral artery.
- Venous blood will flow into the syringe when the needle is in the femoral vein.
- Proceed with cannulation of the vein by advancing the cannula at an angle of 10° to the skin.
- Stitch the cannula in place, and put a sterile occlusive dressing on the skin under the cannula and another one over the top of the cannula. Fix firmly in place with adhesive tape. It may be necessary to splint the leg to prevent flexion of the hip.
- Monitor the site closely for as long as the cannula is in place, taking care to keep the leg immobile during the infusion. A femoral line can last for up to 5 days with correct care.
- Withdraw the cannula after the IV infusion has been given, and apply firm pressure over the site for 2–3 min.

A1.2.4 Venous cut-down

This is less appropriate if speed is essential.

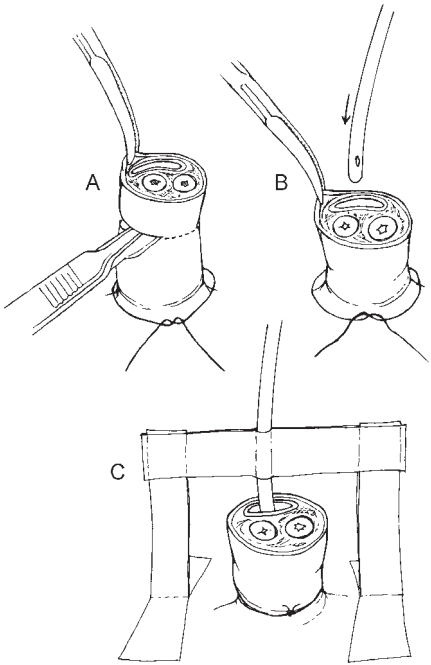
- Immoblize the child's lower leg, and clean the skin, as described above. Identify the long saphenous vein, which lies half a fingerbreadth (in the infant) or one fingerbreadth (in the older child) superior and anterior to the medial malleolus.
- Infiltrate the skin with 1% lignocaine, and make an incision through the skin perpendicular to the course of the vein. Bluntly dissect the subcutaneous tissue with haemostat forceps.
- Identify and free a 1–2-cm strip of vein. Pass a proximal and a distal ligature.
- Tie off the distal end of the vein, keeping the ties as long as possible.
- Make a small hole in the upper part of the exposed vein and insert the cannula into this, while holding the distal tie to stabilize the position of the vein.
- Secure the cannula in place with the upper ligature.
- Attach a syringe filled with normal saline, and ensure that the fluid flows freely up the vein. If it does not, check that the cannula is in the vein, or try withdrawing it slightly to improve the flow.

- Tie the distal ligature around the catheter, and then close the skin incision with interrupted sutures. Fix the cannula to the skin and cover with a sterile dressing.

A1.2.5 Umbilical vein catheterization

This procedure can be used for resuscitation or exchange transfusion and is usually possible in neonates in the first few days of life. In some circumstances, it might be possible at up to 5 days of life.

- Attach a sterile three-way tap and syringe to a sterile 5 French gauge catheter and fill with sterile 0.9% saline, then close the tap to prevent air entry (which may cause an air embolus).



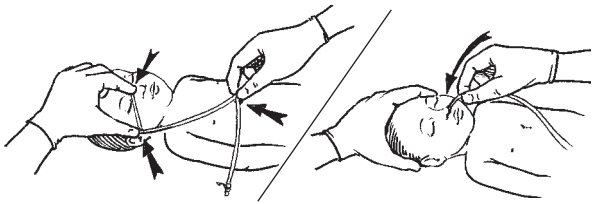
Inserting an umbilical vein catheter

A. Preparation of the umbilical cord
B. Inserting the catheter into the umbilical vein. This is the larger, thin walled structure towards the head. Note the two umbilical arteries, which are thick-walled and towards the legs of the infant.
C. Fixation of the inserted catheter, which prevents kinking

- Clean the umbilical cord and surrounding skin with an antiseptic solution, and then tie a suture around the base of the cord.
- Cut the cord 1–2 cm from the base with a sterile scalpel. Identify the umbilical vein (larger gaping vessel) and umbilical arteries (two thicker-walled vessels apart from the vein). Hold the cord (near the umbilical vein) with sterile forceps.
- Hold the near end of the catheter with sterile forceps, and advance it into the vein (it should pass easily) for 4–6 cm.
- Check that the catheter is not kinked and that blood draws back easily; if there is a block, pull gently on the cord, pull back the catheter partly, and re-insert.
- Secure with two sutures into the cord, leaving 5-cm long suture ends. Tape the suture and catheter (see diagram).
- After removal, apply pressure to the umbilical stump for 5–10 min.

A1.3 Insertion of a nasogastric tube

- Holding the tip of the tube against the child's nose, measure the distance from the nose to the ear lobe, then to the xiphisternum (epigastrium). Mark the tube at this point.
- Hold the child firmly. Lubricate the tip of the catheter with water, and pass it directly into one nostril, pushing it slowly in. It should pass easily down into the stomach without resistance. When the measured distance is reached, fix the tube with tape at the nose.
- Aspirate a small amount of stomach contents with a syringe to confirm that the tube is in place (check that it turns blue litmus paper pink). If no aspirate is obtained, inject air down the tube and listen over the abdomen with a stethoscope.



Inserting a nasogastric tube. The distance is measured from the nose to the ear and then to the epigastrium, and then the tube is inserted to the measured distance.

- If there is any doubt about the location of the tube, withdraw it and start again.
- When the tube is in place, fix a 20-ml syringe (without the plunger) to the end of the tube, and pour food or fluid into the syringe, allowing it to flow by gravity.

If oxygen therapy is to be given by nasopharyngeal catheter at the same time, pass both tubes down the same nostril and try to keep the other nostril patent by wiping away crusts and secretions, or pass the feeding tube through the mouth.

A1.4 Lumbar puncture

The following are *contraindications*:

- signs of raised intracranial pressure (unequal pupils, rigid posture or paralysis in any of the limbs or trunk, irregular breathing)
- skin infection in the area through which the needle will have to pass

If contraindications are present, the potential value of the information gained from a lumbar puncture should be carefully weighed against the risk of the procedure. If in doubt, it might be better to start treatment for suspected meningitis, and delay performing a lumbar puncture.

Position the child

There are two possible positions:

- lying on the left side (particularly for young infants)
- in the sitting position (particularly for older children)

Lumbar puncture when the child is lying on the side

- A hard surface should be used. Place the child on the side so that the vertebral column is parallel to this surface, and the transverse axis of the back is vertical (see figure next page).
- The assistant should flex the back of the child, pull the knees up towards the chest, and hold the child at the upper back between the shoulders and buttocks so that the back is bent. Hold the child firmly in this position. Make sure that the airway is not obstructed and the child can breathe normally. Take particular care in holding young infants. The assistant should not hold a young infant by the neck nor flex the neck to avoid airway obstruction.

Check anatomical landmarks

Locate the space between the third and fourth or between the fourth and fifth lumbar vertebrae. (The third lumbar vertebra is at the junction of the line between the iliac crests and the vertebral column).

Prepare the site

- Use aseptic technique. Scrub the hands and wear sterile gloves.
- Prepare the skin around the site with an antiseptic solution.
- Sterile towels may be used.
- In older children who are alert, give a local anaesthetic (1% lignocaine) infiltrated in the skin over the site.

Perform the lumbar puncture

- Use a lumbar puncture needle with stylet (22 gauge for a young infant, 20 gauge for an older infant or child; if these are not available, hypodermic needles may be used). Insert the needle into the middle of the intervertebral space, and aim the needle towards the umbilicus.

Restraining an older child in sitting position in order to carry out a lumbar puncture

- Advance the needle slowly. The needle will pass easily until it encounters the ligament between the vertebral processes. More pressure is needed to penetrate this ligament, less resistance is felt as the dura is penetrated. In young infants this decrease in resistance is not always felt, so advance the needle very carefully.
- Withdraw the stylet, and drops of CSF will pass out of the needle. If no CSF is obtained, the stylet can be reinserted and the needle advanced slightly.
- Obtain a sample of 0.5–1 ml CSF, and place in a sterile container.
- Withdraw the needle and stylet completely, and put pressure over the site for a few seconds. Put a sterile dressing over the needle puncture site.
- If the needle is introduced too far, a lumbar vein may be punctured. This will result in a 'traumatic tap', and the spinal fluid will be bloody. The needle should be withdrawn and the procedure repeated in another disc space.

A1.5 Insertion of a chest drain

Pleural effusions should be drained, except when small. It is sometimes necessary to drain both sides of the chest. You may have to drain the chest two or three times if the fluid keeps coming back.

Diagnostic procedure

- Consider giving the child sedation or light anaesthesia with ketamine.
- Wash the hands and put on sterile gloves.
- Lay the child on the back.
- Clean the skin over the chest with an antiseptic solution (for example, 70% alcohol).
- Select a point in the mid-axillary line (at the side of the chest) just below the level of the nipple (fifth intercostal space, see figure on p. 349).
- Inject about 1 ml of 1% lignocaine into the skin and subcutaneous tissue at this point.
- Insert a needle or catheter through the skin and pleura and aspirate to confirm the presence of pleural fluid. Withdraw a sample for microscopy and other tests, and place in a container.

If the fluid is clear (straw-coloured or brownish), pull out the needle or catheter after withdrawing enough fluid to relieve distress, and put a dressing over the puncture site. Consider a differential diagnosis of TB (see section 4.7.2, p. 115).

If the fluid is thin pus or cloudy (like milk), leave the catheter in place so that you can draw out more pus several times a day. Make sure you seal the end of the catheter so that no air can get in.

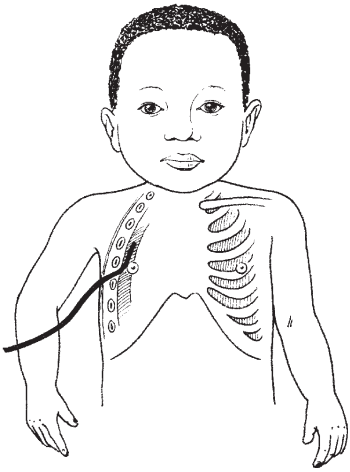
If the fluid is thick pus, which cannot pass easily through the needle or catheter, insert a chest tube (see figure).

Insertion of a chest tube

Select and prepare the site as described above.

- Make a 2–3-cm skin incision along the line of the Intercostal space, just above the rib below (to avoid damaging the vessels which lie under the lower edge of each rib).
- Use sterile forceps to push through the subcutaneous tissue just above the upper edge of the rib, and puncture the pleura.
- Pass a gloved finger into the incision and clear a path to the pleura. (This is not possible in infants.)

- Use the forceps to hold the drainage catheter (16 gauge) and introduce it into the chest for several centimetres, pointing upwards. Ensure that all drainage holes of the catheter are inside the chest.
- Connect the catheter to a collection bottle with an underwater seal.
- Suture the catheter in place, secure with tape, and apply a gauze dressing.



Insertion of a chest tube: the site is selected in the mid-axillary line in the 5th intercostal space (at the level of the nipple) on the superior aspect of the 6th rib.

Needle thoracocentesis

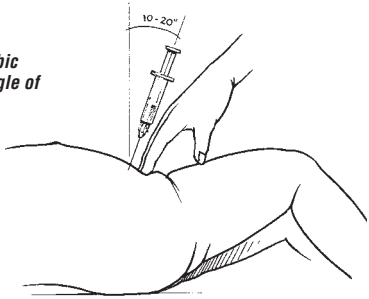
This procedure is used for a rapidly deteriorating patient who has a life-threatening tension pneumothorax (see section 4.3.3, p. 90). In such cases, immediate insertion of a chest drain may subsequently be necessary.

- Identify the second intercostal space in the mid-clavicular line on the side of the pneumothorax (the opposite side to the direction of tracheal deviation and the same side as the hyper-resonance).
- Swab the chest wall with antiseptic or an alcohol swab.
- Attach the syringe to the over-needle or intravenous cannula.
- Insert the cannula into the chest wall, just above the rib below, aspirating all the time.
- If air is aspirated, remove the needle, leaving the plastic cannula in place.
- Tape the cannula in place, and proceed to insert the chest drain as soon as possible.

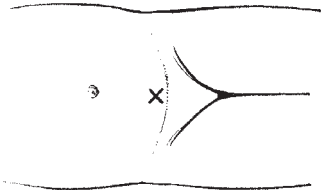
A1.6 Supra-pubic aspiration

Aspirate to a depth of 3 cm in the midline at the proximal transverse crease above the pubis with a 23-gauge needle under sterile conditions. Do this only in a child with a full bladder, which can be demonstrated by percussion. Do not use urine bags to collect urine because the specimens may become contaminated.

Have a clean urine jar ready in case the child passes urine during the procedure.



Position for carrying out suprapubic aspirate – side view. Note the angle of insertion of the needle.



Selecting the place for a suprapubic aspirate. The bladder is punctured in the midline, just above the symphysis.

A1.7 Measuring blood glucose

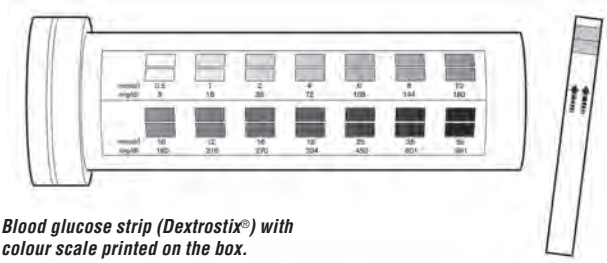
Blood glucose can be measured with a rapid diagnostic test (e.g. Dextrostix®) at the bedside, which provides an estimate of blood glucose within a few minutes. There are several brands on the market, which differ slightly in how they should be used. Instructions on the box and the package leaflet must therefore be read before using them.

Generally, a drop of blood is placed on the reagent strip and left for 30 s to 1 min, depending on the brand of strip. The blood is then wiped off, and after another fixed period (e.g. 1 further minute), the colour change on the reagent

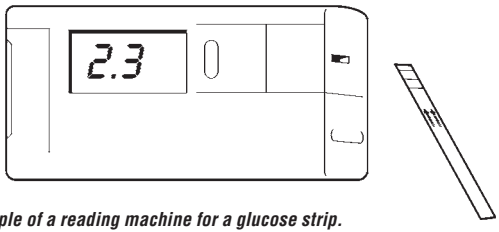
field of the strip is read and compared with a colour scale printed on the box. This allows estimation of the glucose level within a certain range, e.g. between 2 and 5 mmol/l, but does not allow exact determination.

Some strips come with an electronic reading machine, which has a battery as a power source. After the blood is wiped off, the strip is inserted into the reading machine, which provides a more accurate value.

As the reagents deteriorate with exposure to ambient humidity, they must be kept in a closed box, and 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.

Notes

ANNEX 2

Drug dosages and regimens

This section gives the doses of the drugs mentioned in these guidelines that are suitable for infants and children. For ease of use and to avoid having to make calculations, doses are given according to the body weight of the child. As errors in calculating drug doses are common in hospital practice worldwide, calculations should be avoided, when possible. Doses are given covering a range of body weights, from 3–29 kg. A table for neonates in the first 2 months of life is included in Chapter 3, pp. 69–72.

For some drugs (for example, antiretroviral drugs), however, it is better to calculate the **exact** individual doses on the basis of the body weight of the child, where this is possible. The drugs include those for which the exact dose is critically important to ensure a therapeutic effect or to avoid toxicity, e.g. digoxin, chloramphenicol, aminophylline and antiretroviral drugs.

For some antiretroviral drugs, the recommended dosages are often given according to the surface area of the child. A table giving approximate child surface area for different weight categories is given below to help in this calculation. The doses in the table can then be used to check that the calculated dose is approximately correct (and to check that a calculation error has not been made).

$$\text{Body surface area in } m^2 = \sqrt{\frac{\{\text{height (cm)} \times \text{weight (kg)}\}}{3600}}$$

Thus, a child weighing 10 kg and 72 cm long has a body surface area of

$$\sqrt{(10 \times 72/3600)} = 0.45\ m^2$$

Table A2.1 Drug dosage by surface area (m^2) of the child

Age or weight of child	Surface area (m^2)
Neonate (< 1 month)	0.2–0.25
Young infant (1–< 3 months)	0.25–0.35
Child 5–9 kg	0.3–0.45
Child 10–14 kg	0.45–0.6
Child 15–19 kg	0.6–0.8
Child 20–24 kg	0.8–0.9
Child 25–29 kg	0.9–1.1
Child 30–39 kg	1.1–1.3

Example: if the recommended dose is given as 400 mg/m^2 twice a day, then for a child in the weight range 15–19 kg the recommended dose range will be: (0.6–0.8) x 400 = 244–316 mg twice a day.

Drug	Dosage	Form	Dose according to body weight				
			3–< 6 kg	6–< 10 kg	10–<15 kg	15–<20 kg	20–29 kg
Abacavir (see separate table for antiretrovirals, p. 372)							
Adrenaline							
For wheeze	0.01 ml/kg (up to a maximum of 0.3 ml) of 1:1000 solution (or 0.1 ml/kg of 1:10 000 solution) given subcutaneously with a 1-ml syringe		Calculate **exact** dose based on body weight (as rapid-acting bronchodilator)				
For severe viral croup	0.5 ml/kg of 1:1000 solution (maximum dose: 5 ml)		–	3 ml	5 ml	5 ml	5 ml
For anaphylaxis	0.15 ml of 1:1000 solution IM (0.3 ml for children > 6 years)						
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*							
Aminophylline							
For asthma	Oral: 6 mg/kg	Tablets: 100 mg	¼	½	¾	1	1½
		Tablets: 200 mg	–	¼	½	½	¾
	IV: Calculate exact dose based on body weight when possible; use the doses below only when this is not possible.						
	Loading dose: IV: 5–6 mg/kg (max. 300 mg) slowly over 20–60 min	250 g/10-ml vial	1 ml	1.5 ml	2.5 ml	3.5 ml	5 ml

Drug	Dosage	Form	Dose according to body weight				
			3–< 6 kg	6–< 10 kg	10–<15 kg	15–<20 kg	20–29 kg
Aminophylline For asthma (*continued*)	**Maintenance dose:** IV: 5 mg/kg up to every 6 h		1 ml	1.5 ml	2.5 ml	3.5 ml	5 ml
	or by continuous infusion at 0.9 mg/kg per h		Calculate **exact** dose				
Give IV loading dose only if the child has not taken aminophylline or theophylline within 24 h. *For dosage and dosage intervals for apnoea in neonates and premature infants, see p. 69.*							
Amoxicillin	25 mg/kg twice a day	250 mg tablet (chewable or dispersible)	½	1	1½	2	2½
		Syrup (containing 250 mg/5 ml)	2.5 ml	5 ml	7.5 ml	10 ml	–
For pneumonia	40 mg/kg twice a day		1 2.5 ml	1½ 7.5 ml	2 10 ml	3 –	4 –
Amphotericin B For oesophageal candidiasis	0.25 mg/kg per day increasing to 1 mg/kg per day, as tolerated, by IV infusion over 6 h/day for 10–14 days	50 mg vial	–	2–8 mg	3–12 mg	4.5–18 mg	6–24 mg
Ampicillin	IM/IV: 50 mg/kg every 6 h	Vial of 500 mg mixed with 2.1 ml sterile water to give 500 mg/2.5 ml	1 ml	2 ml	3 ml	5 ml	6 ml

Note: *These oral doses are for mild disease. If oral ampicillin is required after a course of injectable ampicillin for severe disease, the oral dose must be two to four times higher than that given here.*
For dosages and dosage intervals in neonates and premature infants, see p. 69.

Drug	Dosage	Form	Dose according to body weight				
			3–< 6 kg	6–< 10 kg	10–<15 kg	15–<20 kg	20–29 kg
Antituberculosis antibiotics (see p. 370)							
Artemether For severe malaria	**Loading dose:** IM: 3.2 mg/kg	40 mg/1-ml ampoule 80 mg/1-ml ampoule	0.4 ml 0.2 ml	0.8 ml 0.4 ml	1.2 ml 0.6 ml	1.6 ml 0.8 ml	2.4 ml 1.2 ml
	Maintenance dose: IM: 1.6 mg/kg	40 mg/1-ml ampoule 80 mg/1-ml ampoule	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
Give the maintenance dose daily for a minimum of 24 h until the patient can take oral artemisinin-based combination therapy.							
Artemether/ lumefantrine	Oral: 2 mg/kg artemether – 12 mg/kg lumefantrine twice per day	Tablet: 20 mg artemether–120 mg lumefantrine	1	1	1	2	2
Artesunate For severe malaria	IV or IM: 2.4 mg/kg	60 mg artesumic acid (already dissolved in 0.6 ml of saline and sodium bicarbonate) in 3.4 ml of saline and glucose	0.8 ml	1.4 ml	2.4 ml	3.0 ml	5.0 ml
The IV solution should be prepared just before use. Dilute by dissolving 60 mg artesunic acid (which is already dissolved in 0.6 ml of 5% sodium bicarbonate) in 3.4 ml of 5% glucose. Give a dose at 0, 12 and 24 h and then daily until child is able to take it orally. If the patient is able to swallow, give the recommended full dose of artemisinin-based combination therapy.							
Artesunate–mefloquine	Oral: 4 mg/kg artesunate–8.3 mg/kg mefloquine once a day	Tablet: 25 mg artesunate–55 mg mefloquine	–	1	2	2	3
Not recommended for children < 5 months of age owing to limited information.							
Aspirin	Oral: 10–20 mg/kg every 4–6 h	300 mg tablet	–	¼	½	¾	1
Note: *Avoid in young children, if possible, because of the risk of Reye syndrome.*							

Drug	Dosage	Form	Dose according to body weight				
			3–< 6 kg	6–< 10 kg	10–<15 kg	15–<20 kg	20–29 kg
Benzathine penicillin – see Penicillin							
Cefotaxime	IV: 50 mg/kg every 6 h	Vial of 500 mg mixed with 2 ml sterile water or vial of 1 g mixed with 4 ml sterile water or vial of 2 g mixed with 8 ml sterile water	0.8 ml	1.5 ml	2.5 ml	3.5 ml	5 ml
For dosage and dosage intervals in neonates and premature infants, see p. 70.							
Ceftriaxone	IV: 80 mg/kg per day as a single dose given over 30 min as infusion or 3 min as IV injection	Vial of 1 g mixed with 9.6 ml sterile water to give 1 g/10 ml **or** vial of 2 g mixed with 19 ml of sterile water to give 2 g/20 ml	3 ml	6 ml	10 ml	14 ml	20 ml
For meningitis	IM/IV: 50 mg/kg every 12 h (max single dose, 4 g)		2 ml	4 ml	6 ml	9 ml	12.5 ml
	or IM/IV: 100 mg/kg		4 ml	8 ml	12 ml	18 ml	25 ml
For dosage and dosage intervals in neonates and premature infants, see p. 70.							
Cefalexin	12.5 mg/kg four times a day	250 mg tablet	¼	½	¾	1	1¼

Drug	Dosage	Form	Dose according to body weight				
			3–< 6 kg	6–< 10 kg	10–<15 kg	15–<20 kg	20–29 kg
Chloramphenicol For meningitis	*Calculate exact dose based on body weight. Use the doses below only if this is not possible.*						
	IV: 25 mg/kg every 6 h (max, 1 g per dose)	Vial of 1 g mixed with 9.2 ml sterile water to give 1 g/10 ml	0.75–1.25 ml	1.5–2.25 ml	2.5–3.5 ml	3.75–4.75 ml	5–7.25 ml
For cholera	IM: 20 mg/kg every 6 h for 3 days	Vial of 1 g mixed with 3.2 ml sterile water to give 1 g/4 ml	0.3–0.5 ml	0.6–0.9 ml	1–1.4 ml	1.5–1.9 ml	2–2.9 ml
For other conditions	Oral: 25 mg/kg every 8 h	125 mg/5 ml suspension (palmitate)	3–5 ml	6–9 ml	10–14 ml	15–19 ml	–
	(maximum 1 g per dose)	250 mg capsule	–	–	1	1½	2
Phenobarbital reduces and phenytoin increases chloramphenicol levels when given together.							
Chloramphenicol, oily (for treatment of meningococcal meningitis during epidemics)	100 mg/kg single dose; max, 3 g	IM: vial of 0.5 g in 2 ml	1.2–2 ml	2.4–3.6 ml	4–5.6 ml	6–7.6 ml	8–11.6 ml
Chlorphenamine	IM/IV or SC:	10 mg in 1 ml	0.1 ml	0.2 ml	0.3 ml	0.5 ml	0.6 ml
	0.25 mg/kg once (can be repeated up to four times in 24 h	IV solution					
	Oral: two or three times daily	Tablet: 4 mg	–	–	–	–	½

Drug	Dosage	Form	Dose according to body weight				
			3–< 6 kg	6–< 10 kg	10–<15 kg	15–<20 kg	20–29 kg
Ciprofloxacin	Oral: 10-20 mg/kg per dose given twice a day for 5 days (max, 500 mg per dose)	100 mg tablet	½	1	1½	2	3
		250 mg tablet	¼	½	½	1	1½
Cloxacillin or flucloxacillin or oxacillin	IV: 25–50 mg/kg every 6 h	Vial of 500 mg mixed with 8-ml dose in sterile water to give 500 mg/10 ml	2–(4) ml	4–(8) ml	6–(12) ml	8–(16) ml	12–(24) ml
	IM: 25–50 mg/kg every 6 h	Vial of 250 mg mixed with 1.3 ml sterile water to give 250 mg/1.5 ml	0.6 (1.2) ml	1 (2) ml	1.8 (3.6) ml	2.5 (5) ml	3.75 (7.5) ml
		250 mg capsule	half (1)	1 (2)	1 (2)	2 (3)	2 (4)
For treating abscesses	15 mg/kg every 6 h	250-mg capsule	¼	½	1	1½	2½
For dosage and dosage intervals in neonates and premature infants, p. 70.							
Co-trimoxazole (trimethoprim-sulfamethoxazole)	4 mg/kg trimethoprim and 20 mg/kg sulfamethoxazole twice a day	Oral: adult tablet (80 mg trimethoprim + 400 mg sulfamethoxazole)	¼	½	1	1	1
		Oral: paediatric tablet (20 mg trimethoprim + 100 mg sulfamethoxazole)	1	2	3	3	4

Drug	Dosage	Form	Dose according to body weight				
			3–< 6 kg	6–< 10 kg	10–<15 kg	15–<20 kg	20–29 kg
Co-trimoxazole (trimethoprim-sulfamethoxazole *(continued)*		Oral: syrup (40 mg trimethoprim + 200 mg sulfamethoxazole per 5 ml)	2 ml	3.5 ml	6 ml	8.5 ml	—
Note: *For interstitial pneumonia in children with HIV, give 8 mg/kg trimethoprim and 40 mg/kg sulfamethoxazole three times a day for 21 days. For an infant < 1 month, give co-trimoxazole (half paediatric tablet or 1.25 ml syrup) twice a day. Avoid co-trimoxazole in neonates who are premature or jaundiced.*							
Deferoxamine For iron poisoning	15 mg/kg per h IV to max of 80 mg/kg in 24 h, or IM: 50 mg/kg every 6 h. Maximum dose, 6 g/day	500-mg ampoule	2	2	2	2	2
Dexamethasone For severe viral croup	Oral: 0.6 mg/kg single dose	0.5-mg tablets					
		IM: 5 mg/ml	0.5 ml	0.9 ml	1.4 ml	2 ml	3 ml
For meningitis	IV: 0.15 mg/kg/dose every 6 h for the first 2–4 days						
Diazepam							
For convulsions	Rectal: 0.5 mg/kg	10 mg/2 ml solution	0.4 ml	0.75 ml	1.2 ml	1.7 ml	2.5 ml
	IV: 0.2–0.3 mg/kg		0.25 ml	0.4 ml	0.6 ml	0.75 ml	1.25 ml
For sedation before procedures	0.1–0.2 mg/kg IV						
Give phenobarbital (20 mg/kg IV or IM) instead of diazepam to neonates. If convulsions continue, give 10 mg/kg IV or IM after 30 min. The maintenance dose of oral phenobarbital is 2.5–5 mg/kg.							

Drug	Dosage	Form	Dose according to body weight				
			3–< 6 kg	6–< 10 kg	10–<15 kg	15–<20 kg	20–29 kg
Digoxin	These doses are for oral digoxin. Give as an initial loading dose followed by twice daily maintenance doses, starting 6 h after the loading dose:						
	Loading dose: 15 µg/kg, once only	62.5-µg tablets	¾–1	1½–2	2½–3½	3½–4½	–
		125-µg tablets	–	–	1-1½	1¾–2	2½–3
	Maintenance dose: (Start 6 h after loading dose) 5 µg/kg every 12 h (max, 250 µg per dose)	62.5-µg tablets	¼–½	½–¾	¾–1	1¼–1½	1½–2¼
Dobutamine For treatment of shock that is unresponsive to fluids	2–20 µg/kg per min	250 mg/20 ml ampoule Dilute to 250 mg in 250 ml of 0.9% sodium chloride with 5% glucose to 1000 µg/ml	Calculate **exact** dose based on body weight and required rate of infusion.				
Diluted solutions may be stored for a maximum of 24 h.							
Dopamine For treatment of shock that is unresponsive to fluids	2–20 µg/kg per min	200 mg/5 ml ampoule Dilute to 250 mg in 250 ml of 0.9% sodium chloride with 5% glucose to 1000 µg/ml	Calculate **exact** dose based on body weight and required rate of infusion.				
Efavirenz (see separate table for antiretrovirals, p. 372)							
Erythromycin (estolate)	Oral: 12.5 mg/kg four times a day for 3 days	250-mg tablet	¼	½	1	1	1½
Must not be given with theophylline (aminophylline) because of risk of serious adverse reactions.							

Drug	Dosage	Form	Dose according to body weight				
			3–< 6 kg	6–< 10 kg	10–<15 kg	15–<20 kg	20–29 kg
Fentanyl	IV injection: 1-4 µg/kg every 2–4 h	Injection: 50 µg/ml	–	Calculate **exact** dose based on body weight, and tailor dose to relieve pain.			
	Infusion: initial IV dose 1–2 µg/kg, then 0.5–1 µg/kg per h		–	Calculate **exact** dose based on body weight and required rate of infusion.			
Fluconazole	3–6 mg/kg once a day	50 mg/5 ml oral suspension	–	–	5 ml	7.5 ml	12.5 ml
For cryptococcal meningitis	6–12 mg/kg once a day	50-mg capsule	–	–	1	1–2	2–3
Flucloxacillin (see Cloxacillin)							
Furazolidone	1.25 mg/kg 4 times a day for 3 days	Oral: 100-mg tablet	–	–	¼	¼	¼
Furosemide (frusemide) For cardiac failure	Oral or IV: 1–2 mg/kg every 12 h	20-mg tablets IV 10 mg/ml	¼–½	½–1	½–1	1–2	1¼–2½
			0.4–0.8 ml	0.8–1.6 ml	1.2–2.4 ml	1.7–3.4 ml	2.5–5 ml
Gentamicin	Calculate **exact** dose based on body weight, and use the doses below only when this is not possible.						
	7.5 mg/kg once a day	IM/IV: vial containing 20 mg (2 ml at 10 mg/ml) undiluted	2.25–3.75 ml	4.5–6.75 ml	7.5–10.5 ml	–	–
		IM/IV: vial containing 80 mg (2 ml at 40 mg/ml) mixed with 6 ml sterile water	2.25–3.75 ml	4.5–6.75 ml	7.5–10.5 ml	–	–

Drug	Dosage	Form	Dose according to body weight				
			3–< 6 kg	6–< 10 kg	10–<15 kg	15–<20 kg	20–29 kg
Gentamicin *(continued)*		IM/IV: vial containing 80 mg (2 ml at 40 mg/ml) undiluted	0.5–0.9 ml	1.1–1.7 ml	1.9–2.6 ml	2.8–3.5 ml	3.75–5.4 ml
Risk for adverse effects when given with theophylline. In administering an aminoglycoside (gentamicin, kanamycin), it is preferable to avoid use of undiluted 40 mg/ml gentamicin.							
For dosage and dosage intervals in neonates and premature infants, see p. 71.							
Gentian violet: Topical application to skin							
Hydromorphone	0.1–0.2 mg/kg every 4 h for two or three doses, then every 6–12 h	Tablet: 2 or 4 mg	–	Calculate **exact** dose based on body weight, and tailor dose to relieve pain.			
		Oral liquid: 1 mg/ml	–				
	0.015–0.02 mg/kg every 3–6 h	IV: 1 or 2 or 4 mg/ml	–	Calculate **exact** dose based on body weight and required rate of infusion.			
Ibuprofen	5–10 mg/kg orally every 6–8 h to a max total daily dose of 40 mg/kg	200-mg tablet	–	¼	¼	½	¾
		400-mg tablet	–	–	–	¼	½
Iron	Once a day for 14 days	Iron–folate tablet (ferrous sulfate 200 mg + 250 µg folate = 60 mg elemental iron	–	–	½	½	1
		Iron syrup (ferrous fumarate, 100 mg per 5 ml = 20 mg/ml elemental iron)	1 ml	1.25 ml	2 ml	2.5 ml	4 ml

Drug	Dosage	Form	Dose according to body weight 3–< 6 kg	6–< 10 kg	10–<15 kg	15–<20 kg	20–29 kg
Kanamycin	Calculate **exact** dose based on body weight. Use the doses below only if this is not possible.						
	IM/IV: 20 mg/kg once a day	250 mg vial (2 ml at 125 mg/ml)	0.5–0.8 ml	1–1.5 ml	1.6–2.2 ml	2.4–3.0 ml	3.2–4.6 ml
For dosage and dosage intervals in neonates and premature infants, see p. 71.							
Ketamine For anaesthesia in major procedures	Calculate **exact** dose based on body weight.						
	IM: Loading dose: 5–8 mg/kg		20–35 mg	40–60 mg	60–100 mg	80–140 mg	125–200 mg
	IM: Further dose: 1–2 mg/kg (if required)		5–10 mg	8–15 mg	12–25 mg	15–35 mg	25–50 mg
	IV: Loading dose: 1–2 mg/kg		5–10 mg	8–15 mg	12–25 mg	15–35 mg	25–50 mg
	IV: Further dose: 0.5–1 mg/kg(if required)		2.5–5 mg	4–8 mg	6–12 mg	8–15 mg	12–25 mg
For light anaesthesia in minor procedures	IM: 2–4 mg/kg						
	IV: 0.5–1 mg/kg						
Dose details and method of administration are given on p. 258.							
Lamivudine (see separate table for antiretrovirals, p. 372)							
Lidocaine	Apply topically (see p. 307) Local injection: 4–5 mg/kg per dose as local anaesthetic						
Mebendazole	100 mg twice a day for 3 days	100-mg tablet	–	–	1	1	1
	500 mg once only	500-mg tablet	–	–	1	1	1
Not recommended for children < 5 months of age owing to limited information.							

Drug	Dosage	Form	Dose according to body weight				
			3–< 6 kg	6–< 10 kg	10–<15 kg	15–<20 kg	20–29 kg
Metoclopramide For nausea and vomiting	0.1–0.2 mg/kg every 8 h as required (maximum dose: 10 mg/dose)	10-mg tablets	–	–	¼	¼	½
		Injection: 5 mg/ml	–	–	0.5 ml	0.7 ml	1 ml
Metronidazole	Oral: 7.5 mg/kg three times a day for 7 days	200-mg tablet	–	¼	½	½	1
		400-mg tablet	–	–	¼	¼	½
For the treatment of giardiasis, and for amoebiasis, 10 mg/kg.							
Morphine	Calculate **exact** dose based on weight of the child. Oral: 0.2–0.4 mg/kg every 4–6 h; increase if necessary for severe pain IM: 0.1–0.2 mg/kg every 4–6 h IV: 0.05–0.1 mg/kg every 4–6 h, or 0.005–0.01 mg/kg per h by IV infusion						
Nevirapine (see separate table for antiretrovirals, p. 373)							
Nystatin	Oral: 100 000–200 000 U into the mouth	Oral suspension 100 000 units/ml	1–2 ml	1–2 ml	1–2 ml	1–2 ml	1–2 ml
Oxacillin (see Cloxacillin)							
Paracetamol	10–15 mg/kg, up to six times a day	100-mg tablet	–	1	1	2	3
		500-mg tablet	–	¼	¼	½	½

Drug	Dosage	Form	Dose according to body weight				
			3–< 6 kg	6–< 10 kg	10–<15 kg	15–<20 kg	20–29 kg
PENICILLIN							
Benzathine benzylpenicillin	50 000 U/kg once a day	IM: vial of 1 200 000 U mixed with 4 ml sterile water	0.5 ml	1 ml	2 ml	3 ml	4 ml
Benzylpenicillin (penicillin G) General dosage	IV: 50 000 U/kg every 6 h						
		Vial of 600 mg mixed with 9.6 ml sterile water to give 1 000 000 U/10 ml	2 ml	3.75 ml	6 ml	8.5 ml	12.5 ml
	IM:	Vial of 600 mg (1 000 000 U) mixed with 1.6 ml sterile water to give 1 000 000 U/2 ml	0.4 ml	0.75 ml	1.2 ml	1.7 ml	2.5 ml
For meningitis	100 000 U/kg every 6 h	IV	4 ml	7.5 ml	12 ml l	17 ml	25 ml
		IM	0.8 ml	1.5 ml	2.5 ml	3.5 ml l	5 m
For dosage and dosage intervals in neonates and premature infants, see p. 71.							
Procaine benzylpenicillin	IM: 50 000 U/kg once a day	3-g vial (3 000 000 U) mixed with 4 ml sterile water	0.25 ml	0.5 ml	0.8 ml	1.2 ml	1.7 ml
Phenobarbital	IM: Loading dose: 15 mg/kg	200 mg/ml solution	0.4 ml	0.6 ml	1.0 ml	1.5 ml	2.0 ml
	Oral or IM: Maintenance dose: 2.5–5 mg/kg		0.1 ml	0.15 ml	0.25 ml	0.35 ml	0.5 ml
Give phenobarbital (20 mg/kg IV or IM) instead of diazepam to neonates. If convulsions continue, give 10 mg/kg IV or IM after 30 min.							

Drug	Dosage	Form	Dose according to body weight				
			3–< 6 kg	6–< 10 kg	10–<15 kg	15–<20 kg	20–29 kg
Potassium Chloride	2–4 mmol/kg per day		Calculate **exact** dose				
Prednisolone	Oral: 1 mg/kg twice a day for 3 days	5-mg tablet	1	1	2	3	5
1 mg prednisolone is equivalent to 5 mg hydrocortisone or 0.15 mg dexamethasone.							
Quinine (mg/kg expressed as mg of quinine hydrochloride salt)	IV: Loading dose: 20 mg salt/kg given slowly over 2–4 h after dilution in 10 ml/kg of IV fluid		Loading dose is double the maintenance dose given below. Infusion rate should not exceed a total of 5 mg quinine dihydrochloride salt/kg per h.				
	IV: Maintenance dose: 10 mg salt/kg given slowly over 2 h after dilution in 10 ml/kg of IV fluid	IV (undiluted): quinine dihydrochloride injection 150 mg/ml (in 2-ml ampoules)	0.3 ml	0.6 ml	1 ml	1.2 ml	2 ml
		IV (undiluted): quinine dihydrochloride injection 300 mg/ml (in 2-ml ampoules)	0.2 ml	0.3 ml	0.5 ml	0.6 ml	1 ml
	If IV infusion is not possible, quinine dihydrochloride can be given at the same dosages IM	IM quinine dihydrochloride (diluted): in normal saline to a concentration of 60 mg salt/ml	1 ml	1.5 ml	2.5 ml	3 ml	5 ml
		Oral: quinine sulfate 200-mg tablet	¼	½	¾	1	1½

Drug	Dosage	Form	Dose according to body weight				
			3–< 6 kg	6–< 10 kg	10–<15 kg	15–<20 kg	20–29 kg
Quinine *(continued)*		Oral: quinine sulfate 300-mg tablet	–	–	½	½	1
Note: *At 8 h after the start of the loading dose, give the maintenance dose listed here over 2 h. Repeat every 8 h. Give a full dose of oral artemisinin combination therapy treatment when the child is able to take orally to complete treatment.*							
Ritonavir (see Lopinavir/ritonavir in separate table for antiretrovirals, p. 373)							
Salbutamol	**Inhaler with spacer:** two doses contain 200 µg	Metered dose inhaler containing 200 doses					
	Nebulizer: 2.5 mg/dose	5 mg/ml solution, 2.5 mg in 2.5 ml single-dose units					
Silver sulfadiazine: apply topically to area of affected skin							
Spectinomycin For neonatal ophthalmia	IM: 25 mg/kg single dose (max, 75 mg)	2-g vial in 5 ml diluent	0.25 ml	–	–	–	–
Tetracaine, adrenaline, cocaine: Apply topically before painful procedures.							
Tetracycline	12.5 mg/kg four times a day for 3 days	250-mg tablet	–	½	½	1	1
Give to children only for treatment of cholera, because permanently stains teeth.							
Vitamin A	Once a day for 2 days	200 000 IU capsule	–	½	1	1	1
		100 000 IU capsule	½	1	2	2	2
		50 000 IU capsule	1	2	4	4	4
Zidovudine (see separate table for antiretrovirals, p. 372)							

Antituberculous antibiotics

Calculate **exact** dose based on body weight

Essential anti-TB drug (abbreviation)	Mode of action	Daily dose: mg/kg (range)
Isoniazid (H)	Bactericidal	10 (10–15)
Rifampicin (R)	Bactericidal	15 (10–20)
Pyrazinamide (Z)	Bactericidal	35 (30–40)
Ethambutol (E)	Bacteriostatic	20 (15–25)
Streptomycin (S): use only for MDR TB treatment	Bactericidal	15 (12–18)

Antiretrovirals

Drug	Dosage	Form	Dose according to surface area or body weight (morning and evening) 3–5.9 kg	6–9.9 kg	10–13.9 kg	14–19.9 kg	20–24.9 kg	25–34.9 kg
Fixed-dose combinations								
Zidovudine/ lamivudine (AZT/3TC)	AZT: 180–240 mg/ m^2 twice a day 3TC: 4 mg/kg twice a day	AZT 60 mg + 3TC 30 mg	1	1.5	2	2.5	3	–
		AZT 300 mg + 3TC 150 mg	–	–	–	–	–	1
Zidovudine/ lamivudine /nevirapine (AZT/3TC/ NVP)	AZT: 180–240 mg/ m^2 twice a day 3TC: 4 mg/kg twice a day NVP: 160–200 mg/m^2	AZT 60 mg + 3TC 30 mg + NVP 50 mg	1	1.5	2	2.5	3	–
		AZT 300 mg + 3TC 150 mg + NVP 200 mg	–	–	–	–	–	1

Drug	Dosage	Form	Dose according to surface area or body weight (morning and evening) 3–5.9 kg	6–9.9 kg	10–13.9 kg	14–19.9 kg	20–24.9 kg	25–34.9 kg
Fixed-dose combinations (*continued*)								
Abacavir/ zidovudine / lamivudine (ABC/ AZT/3TC)	ABC: 8 mg/kg twice a day AZT: 180–240 mg/ m^2 twice a day 3TC: 4 mg/kg twice a day	ABC 60 mg + AZT 60 mg + 3TC 30 mg	1	1.5	2	2.5	3	–
		ABC 300 mg + AZT 300 mg + 3TC 150 mg	–	–	–	–	–	1
Abacavir/ lamivudine (ABC/3TC)	Abacavir: 8 mg/kg twice a day Lamivudine: 4 mg/kg twice a day	Paediatric: ABC 60 mg + 3TC 30 mg	1	1.5	2	2.5	3	–
		Adult: ABC 600 mg + 3TC 300 mg	–	–	–	–	–	½
Adult ABC/3TC fixed-dose combination tablets are not scored; a tablet cutter would be required to divide these tablets. Consider giving one tablet daily.								
Stavudine/ lamivudine (d4T/3TC)	d4T: 1 mg/kg twice a day 3TC: 4 mg/kg twice a day	d4T 6 mg + 3TC 30 mg	1	1.5	2	2.5	3	–
		or d4T 30 mg + 3TC 150 mg	–	–	–	–	–	1
Stavudine/ lamivudine/ nevirapine (d4T/3TC/ NVP)	d4T: 1 mg/kg twice a day 3TC: 4 mg/kg twice a day NVP: 160–200 mg/m^2	d4T 6 mg + 3TC 30 mg + NVP 50 mg	1	1.5	2	2.5	3	–
		or d4T 30 mg + 3TC 150 mg + NVP 200 mg	–	–	–	–	–	1
NVP, maximum dose of 200 mg twice a day								
Lopinavir/ritonavir (LPV/RTV) (see protease inhibitors p. 373)								

Drug	Dosage	Form	Dose according to surface area or body weight (morning and evening) 3–5.9 kg	6–9.9 kg	10–13.9 kg	14–19.9 kg	20–24.9 kg	25–34.9 kg
Nucleoside reverse transcriptase Inhibitors (NRTIs)								
Abacavir (ABC)	8 mg/kg per dose twice a day	Liquid: 20 mg/ml	3 ml	4 ml	6 ml	–	–	–
		Tablet: 60 mg	1	1½	2	2½	3	–
		Tablet: 300 mg	–	–	–	½	1	1
Lamivudine (3TC)	4 mg/kg per dose twice a day	Liquid: 10 mg/ml	3 ml	4 ml	6 ml	–	–	–
		Tablet: 150 mg	–	–	–	½	1	1
Tenofovir (TDF)	8 mg/kg once a day (max 300 mg)	Oral powder scoops	–	–	2.5	3.5	4.5	6.0
		Tablet: 150 mg	–	–	–	1	–	–
		Tablet: 200 mg	–	–	–	–	1	–
		Tablet: 250 mg	–	–	–	–	–	1
Zidovudine (AZT or ZDV)	Oral: 180–240 mg/m^2 per dose given twice a day (total daily dose 360–480 mg/m^2)	Liquid: 10 mg/ml	6 ml	9 ml	–	–	–	–
		Tablet: 60 mg	1	1½	2	2½	3	–
Non-nucleoside reverse transcriptase Inhibitors (NNRTIs)								
Efavirenz	15 mg/kg per day once a day	Tablet: 200 mg	Insufficient data on dosing for children < 3 years or weighing < 10 kg		1 daily	1.5 daily	1.5 daily	2 daily

Higher doses of LPV/RTV may be required when co-administered with enzyme-inducing drugs such as nevirapine, efavirenz, fos-amprenavir and rifampicin.

Drug	Dosage	Form	Dose according to surface area or body weight (morning and evening)					
			3–5.9 kg	6–9.9 kg	10–13.9 kg	14–19.9 kg	20–24.9 kg	25–34.9 kg
Nevirapine	160–200 mg/m² to maximum of 200 mg twice a day	Liquid: 10 mg/ml	5 ml	8 ml	10 ml	–	–	–
		Tablet: 50 mg	1	1½	2	2½	3	
		Tablet: 200 mg	–	–	–	½	1 & ½	1

Divided into unequal doses, give one dose in the morning and the other in the evening.

Drug	Dosage	Form	Dose according to surface area or body weight (morning and evening)					
			3–5.9 kg	6–9.9 kg	10–13.9 kg	14–19.9 kg	20–24.9 kg	25–34.9 kg
Protease inhibitors								
Lopinavir/ ritonavir (LPV/RTV)	230–350 mg/m² twice a day	Liquid: (LPV 80 mg + RTV 20 mg)/ml	1 or 1.5 ml	1.5 ml	2 ml	2.5 ml	3 ml	–
		Paediatric tablet: LPV 100 mg/RTV 25 mg	–	–	2	2	2	3
		Adult tablet: LPV 200 mg/RTV 50 mg	–	–	1	1	1	1½

Higher doses of LPV/RTV may be required when co-administered with enzyme-inducing drugs such as nevirapine, efavirenz, fos-amprenavir and rifampicin.

Notes

ANNEX 3

Equipment sizes

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
Central venous cannula	20	20	18	18
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

ANNEX 4

Intravenous fluids

The following table gives the composition of IV fluids that are commercially available and commonly used for neonates, infants and children. For a decision on which fluid to use in particular circumstances, see the disease-specific chapters, e.g. for shock (pp. 13–14), for neonates (p. 57), for severely malnourished children (p. 204), for surgical procedures (p. 261) and for general supportive therapy (p. 304). Please note that none of the fluids contains sufficient calories for the long-term nutritional support of children, but that some fluids contain less than others. When feed and fluids can be given by mouth or nasogastric tube, this is the safest, preferable 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.

A4.1 Choice of intravenous fluids

The risk for hyponatraemia may be increased with use of solutions containing very low sodium in paediatric patients, in comparison with fluids with a sodium content of 75–150 mmol/litre. Solutions containing low sodium, such as 0.18% sodium chloride with 4% glucose, or 5% glucose in water, should not be used for rehydration or fluid maintenance. Appropriate sodium-containing IV maintenance fluids should contain glucose to avoid hypoglycaemia and starvation ketosis in children who are unable to feed orally or by nasogastric tube.

- **Resuscitation:** Children who are severely dehydrated or with signs of shock should be resuscitated with isotonic IV solutions (normal saline 0.9% or Ringer's lactate).
- **Intravenous maintenance fluid:** Children who require IV fluids for maintenance should be managed with Ringer's lactate solution with 5% dextrose or 0.9% normal saline with 5% glucose or half-normal saline (0.45% sodium chloride) with 5% glucose.

Notes

ANNEX 5

Assessing nutritional status

A5.1 Calculating a child's weight-for-age

To calculate a child's weight-for-age, use the tables below or the charts on pp. 384–5.

In the table:

- Locate the appropriate table for boys or girls.
- Locate the row containing the child's age in the left column.
- Note where the child's weight lies with respect to the weights recorded in this row.
- Look up the column to read the weight-for-age of the child.

Example 1: Boy aged 5 months weighing 5.3 kg. His weight-for-age is –3 SD.

Example 2: Girl aged 27 months weighing 6.5 kg. Her weight-for-age is < –3 SD.

The lines in the charts on pp. 384–5 correspond to –2 (low weight-for-age) and –3 SD (very low weight-for-age). Please note that you should use tables in section A5.2, pp. 386–402 for weight-for-height to determine whether a child has severe acute malnutrition.

Table A5.1.1 Weight-for-age from birth to 5 years: Boys

Months	–3 SD	–2 SD	–1 SD	Median	1 SD	2 SD	3 SD
0	2.1	2.5	2.9	3.3	3.9	4.4	5.0
1	2.9	3.4	3.9	4.5	5.1	5.8	6.6
2	3.8	4.3	4.9	5.6	6.3	7.1	8.0
3	4.4	5.0	5.7	6.4	7.2	8.0	9.0
4	4.9	5.6	6.2	7.0	7.8	8.7	9.7
5	5.3	6.0	6.7	7.5	8.4	9.3	10.4
6	5.7	6.4	7.1	7.9	8.8	9.8	10.9
7	5.9	6.7	7.4	8.3	9.2	10.3	11.4
8	6.2	6.9	7.7	8.6	9.6	10.7	11.9

Months	–3 SD	–2 SD	–1 SD	Median	1 SD	2 SD	3 SD
9	6.4	7.1	8.0	8.9	9.9	11.0	12.3
10	6.6	7.4	8.2	9.2	10.2	11.4	12.7
11	6.8	7.6	8.4	9.4	10.5	11.7	13.0
12	6.9	7.7	8.6	9.6	10.8	12.0	13.3
13	7.1	7.9	8.8	9.9	11.0	12.3	13.7
14	7.2	8.1	9.0	10.1	11.3	12.6	14.0
15	7.4	8.3	9.2	10.3	11.5	12.8	14.3
16	7.5	8.4	9.4	10.5	11.7	13.1	14.6
17	7.7	8.6	9.6	10.7	12.0	13.4	14.9
18	7.8	8.8	9.8	10.9	12.2	13.7	15.3
19	8.0	8.9	10.0	11.1	12.5	13.9	15.6
20	8.1	9.1	10.1	11.3	12.7	14.2	15.9
21	8.2	9.2	10.3	11.5	12.9	14.5	16.2
22	8.4	9.4	10.5	11.8	13.2	14.7	16.5
23	8.5	9.5	10.7	12.0	13.4	15.0	16.8
24	8.6	9.7	10.8	12.2	13.6	15.3	17.1
25	8.8	9.8	11.0	12.4	13.9	15.5	17.5
26	8.9	10.0	11.2	12.5	14.1	15.8	17.8
27	9.0	10.1	11.3	12.7	14.3	16.1	18.1
28	9.1	10.2	11.5	12.9	14.5	16.3	18.4
29	9.2	10.4	11.7	13.1	14.8	16.6	18.7
30	9.4	10.5	11.8	13.3	15.0	16.9	19.0
31	9.5	10.7	12.0	13.5	15.2	17.1	19.3
32	9.6	10.8	12.1	13.7	15.4	17.4	19.6
33	9.7	10.9	12.3	13.8	15.6	17.6	19.9
34	9.8	11.0	12.4	14.0	15.8	17.8	20.2
35	9.9	11.2	12.6	14.2	16.0	18.1	20.4
36	10.0	11.3	12.7	14.3	16.2	18.3	20.7
37	10.1	11.4	12.9	14.5	16.4	18.6	21.0
38	10.2	11.5	13.0	14.7	16.6	18.8	21.3
39	10.3	11.6	13.1	14.8	16.8	19.0	21.6

Months	–3 SD	–2 SD	–1 SD	Median	1 SD	2 SD	3 SD
40	10.4	11.8	13.3	15.0	17.0	19.3	21.9
41	10.5	11.9	13.4	15.2	17.2	19.5	22.1
42	10.6	12.0	13.6	15.3	17.4	19.7	22.4
43	10.7	12.1	13.7	15.5	17.6	20.0	22.7
44	10.8	12.2	13.8	15.7	17.8	20.2	23.0
45	10.9	12.4	14.0	15.8	18.0	20.5	23.3
46	11.0	12.5	14.1	16.0	18.2	20.7	23.6
47	11.1	12.6	14.3	16.2	18.4	20.9	23.9
48	11.2	12.7	14.4	16.3	18.6	21.2	24.2
49	11.3	12.8	14.5	16.5	18.8	21.4	24.5
50	11.4	12.9	14.7	16.7	19.0	21.7	24.8
51	11.5	13.1	14.8	16.8	19.2	21.9	25.1
52	11.6	13.2	15.0	17.0	19.4	22.2	25.4
53	11.7	13.3	15.1	17.2	19.6	22.4	25.7
54	11.8	13.4	15.2	17.3	19.8	22.7	26.0
55	11.9	13.5	15.4	17.5	20.0	22.9	26.3
56	12.0	13.6	15.5	17.7	20.2	23.2	26.6
57	12.1	13.7	15.6	17.8	20.4	23.4	26.9
58	12.2	13.8	15.8	18.0	20.6	23.7	27.2
59	12.3	14.0	15.9	18.2	20.8	23.9	27.6
60	12.4	14.1	16.0	18.3	21.0	24.2	27.9

Table A5.1.2 Weight-for-age from birth to 5 years: Girls

Months	–3 SD	–2 SD	–1 SD	Median	1 SD	2 SD	3 SD
0	2.0	2.4	2.8	3.2	3.7	4.2	4.8
1	2.7	3.2	3.6	4.2	4.8	5.5	6.2
2	3.4	3.9	4.5	5.1	5.8	6.6	7.5
3	4.0	4.5	5.2	5.8	6.6	7.5	8.5
4	4.4	5.0	5.7	6.4	7.3	8.2	9.3
5	4.8	5.4	6.1	6.9	7.8	8.8	10.0
6	5.1	5.7	6.5	7.3	8.2	9.3	10.6

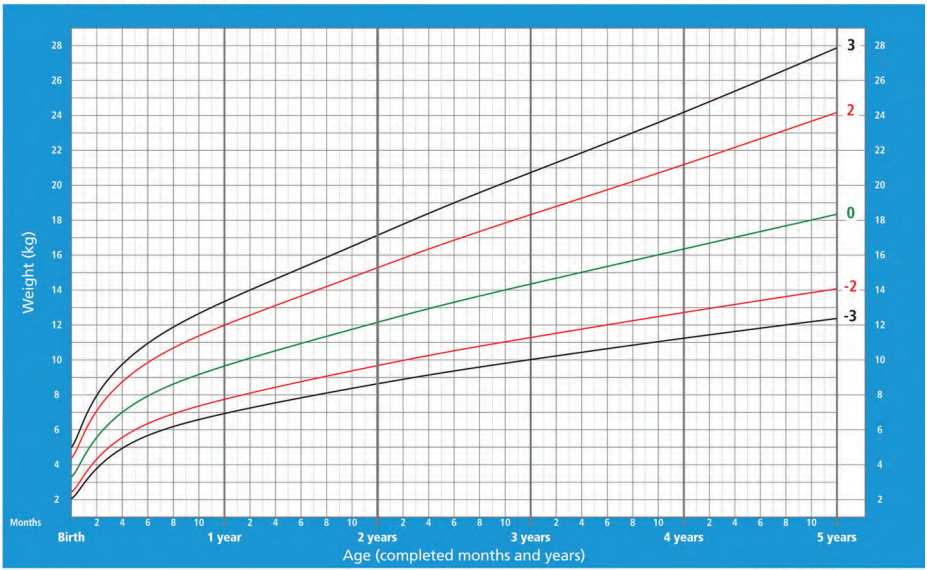
Months	–3 SD	–2 SD	–1 SD	Median	1 SD	2 SD	3 SD
7	5.3	6.0	6.8	7.6	8.6	9.8	11.1
8	5.6	6.3	7.0	7.9	9.0	10.2	11.6
9	5.8	6.5	7.3	8.2	9.3	10.5	12.0
10	5.9	6.7	7.5	8.5	9.6	10.9	12.4
11	6.1	6.9	7.7	8.7	9.9	11.2	12.8
12	6.3	7.0	7.9	8.9	10.1	11.5	13.1
13	6.4	7.2	8.1	9.2	10.4	11.8	13.5
14	6.6	7.4	8.3	9.4	10.6	12.1	13.8
15	6.7	7.6	8.5	9.6	10.9	12.4	14.1
16	6.9	7.7	8.7	9.8	11.1	12.6	14.5
17	7.0	7.9	8.9	10.0	11.4	12.9	14.8
18	7.2	8.1	9.1	10.2	11.6	13.2	15.1
19	7.3	8.2	9.2	10.4	11.8	13.5	15.4
20	7.5	8.4	9.4	10.6	12.1	13.7	15.7
21	7.6	8.6	9.6	10.9	12.3	14.0	16.0
22	7.8	8.7	9.8	11.1	12.5	14.3	16.4
23	7.9	8.9	10.0	11.3	12.8	14.6	16.7
24	8.1	9.0	10.2	11.5	13.0	14.8	17.0
25	8.2	9.2	10.3	11.7	13.3	15.1	17.3
26	8.4	9.4	10.5	11.9	13.5	15.4	17.7
27	8.5	9.5	10.7	12.1	13.7	15.7	18.0
28	8.6	9.7	10.9	12.3	14.0	16.0	18.3
29	8.8	9.8	11.1	12.5	14.2	16.2	18.7
30	8.9	10.0	11.2	12.7	14.4	16.5	19.0
31	9.0	10.1	11.4	12.9	14.7	16.8	19.3
32	9.1	10.3	11.6	13.1	14.9	17.1	19.6
33	9.3	10.4	11.7	13.3	15.1	17.3	20.0
34	9.4	10.5	11.9	13.5	15.4	17.6	20.3
35	9.5	10.7	12.0	13.7	15.6	17.9	20.6
36	9.6	10.8	12.2	13.9	15.8	18.1	20.9
37	9.7	10.9	12.4	14.0	16.0	18.4	21.3

Months	–3 SD	–2 SD	–1 SD	Median	1 SD	2 SD	3 SD
38	9.8	11.1	12.5	14.2	16.3	18.7	21.6
39	9.9	11.2	12.7	14.4	16.5	19.0	22.0
40	10.1	11.3	12.8	14.6	16.7	19.2	22.3
41	10.2	11.5	13.0	14.8	16.9	19.5	22.7
42	10.3	11.6	13.1	15.0	17.2	19.8	23.0
43	10.4	11.7	13.3	15.2	17.4	20.1	23.4
44	10.5	11.8	13.4	15.3	17.6	20.4	23.7
45	10.6	12.0	13.6	15.5	17.8	20.7	24.1
46	10.7	12.1	13.7	15.7	18.1	20.9	24.5
47	10.8	12.2	13.9	15.9	18.3	21.2	24.8
48	10.9	12.3	14.0	16.1	18.5	21.5	25.2
49	11.0	12.4	14.2	16.3	18.8	21.8	25.5
50	11.1	12.6	14.3	16.4	19.0	22.1	25.9
51	11.2	12.7	14.5	16.6	19.2	22.4	26.3
52	11.3	12.8	14.6	16.8	19.4	22.6	26.6
53	11.4	12.9	14.8	17.0	19.7	22.9	27.0
54	11.5	13.0	14.9	17.2	19.9	23.2	27.4
55	11.6	13.2	15.1	17.3	20.1	23.5	27.7
56	11.7	13.3	15.2	17.5	20.3	23.8	28.1
57	11.8	13.4	15.3	17.7	20.6	24.1	28.5
58	11.9	13.5	15.5	17.9	20.8	24.4	28.8
59	12.0	13.6	15.6	18.0	21.0	24.6	29.2
60	12.1	13.7	15.8	18.2	21.2	24.9	29.5

Weight-for-age BOYS

Birth to 5 years (z-scores)

World Health Organization

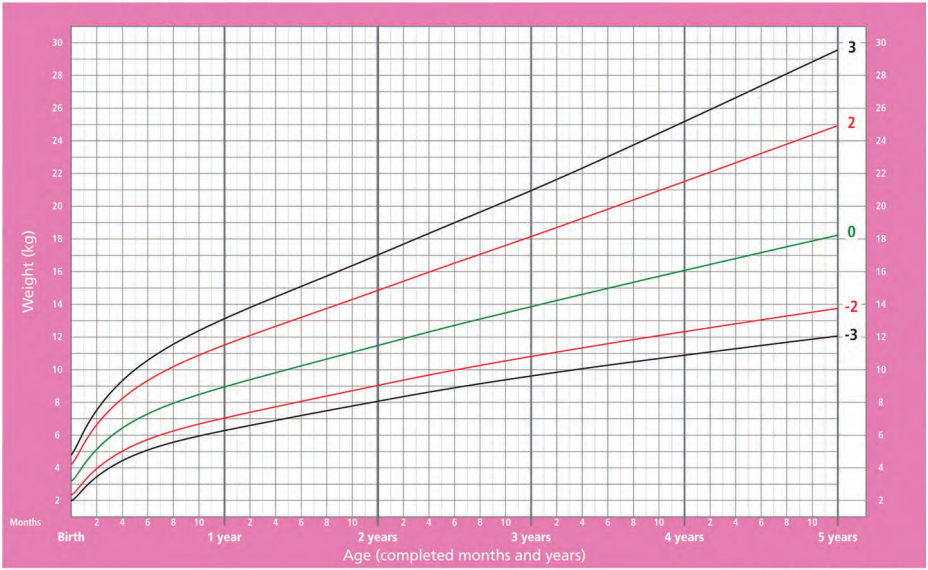


WHO Child Growth Standards

Weight-for-age GIRLS

Birth to 5 years (z-scores)

World Health Organization



WHO Child Growth Standards

A5.2 Calculating a child's weight-for-length or -height

Tables A5.2.1 and A5.2.2 on pp. 386, 391 give the WHO normalized reference weight-for-length (45–110 cm) and A5.2.3 and A5.2.4 on pp. 395–9 weight-for-height (65–120 cm), by sex.

The interpretation of a fixed percentage of the median value varies by age and height, and generally the two scales cannot be compared. The approximate percentage of the median values for –1 and –2 SD are 90% and 80% of the median, respectively.[1]

'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.

In the tables:

- Locate the appropriate table for boys or girls.
- Locate the row containing the child's length in the left column.
- Note where the child's weight lies with respect to the lengths recorded in this row.
- Look up the column to read the weight-for-length of the child.

Example 1: Boy: length 61 cm, weight 5.3 kg. His weight-for-length is –2 SD.

Example 2: Girl: length 67 cm, weight 4.3 kg. Her weight-for-length is < –3SD.

Table A5.2.1 Weight-for-length from birth to 2 years: Boys

Length (cm)	–3 SD	–2 SD	–1 SD	Median	1 SD	2 SD	3 SD
45.0	1.9	2.0	2.2	2.4	2.7	3.0	3.3
45.5	1.9	2.1	2.3	2.5	2.8	3.1	3.4
46.0	2.0	2.2	2.4	2.6	2.9	3.1	3.5
46.5	2.1	2.3	2.5	2.7	3.0	3.2	3.6
47.0	2.1	2.3	2.5	2.8	3.0	3.3	3.7
47.5	2.2	2.4	2.6	2.9	3.1	3.4	3.8
48.0	2.3	2.5	2.7	2.9	3.2	3.6	3.9
48.5	2.3	2.6	2.8	3.0	3.3	3.7	4.0

[1] Gorstein J et al. Issues in the assessment of nutritional status using anthropometry. *Bulletin of the World Health Organization*, 1994, 72:273–283.

Length (cm)	–3 SD	–2 SD	–1 SD	Median	1 SD	2 SD	3 SD
49.0	2.4	2.6	2.9	3.1	3.4	3.8	4.2
49.5	2.5	2.7	3.0	3.2	3.5	3.9	4.3
50.0	2.6	2.8	3.0	3.3	3.6	4.0	4.4
50.5	2.7	2.9	3.1	3.4	3.8	4.1	4.5
51.0	2.7	3.0	3.2	3.5	3.9	4.2	4.7
51.5	2.8	3.1	3.3	3.6	4.0	4.4	4.8
52.0	2.9	3.2	3.5	3.8	4.1	4.5	5.0
52.5	3.0	3.3	3.6	3.9	4.2	4.6	5.1
53.0	3.1	3.4	3.7	4.0	4.4	4.8	5.3
53.5	3.2	3.5	3.8	4.1	4.5	4.9	5.4
54.0	3.3	3.6	3.9	4.3	4.7	5.1	5.6
54.5	3.4	3.7	4.0	4.4	4.8	5.3	5.8
55.0	3.6	3.8	4.2	4.5	5.0	5.4	6.0
55.5	3.7	4.0	4.3	4.7	5.1	5.6	6.1
56.0	3.8	4.1	4.4	4.8	5.3	5.8	6.3
56.5	3.9	4.2	4.6	5.0	5.4	5.9	6.5
57.0	4.0	4.3	4.7	5.1	5.6	6.1	6.7
57.5	4.1	4.5	4.9	5.3	5.7	6.3	6.9
58.0	4.3	4.6	5.0	5.4	5.9	6.4	7.1
58.5	4.4	4.7	5.1	5.6	6.1	6.6	7.2
59.0	4.5	4.8	5.3	5.7	6.2	6.8	7.4
59.5	4.6	5.0	5.4	5.9	6.4	7.0	7.6
60.0	4.7	5.1	5.5	6.0	6.5	7.1	7.8
60.5	4.8	5.2	5.6	6.1	6.7	7.3	8.0
61.0	4.9	5.3	5.8	6.3	6.8	7.4	8.1
61.5	5.0	5.4	5.9	6.4	7.0	7.6	8.3
62.0	5.1	5.6	6.0	6.5	7.1	7.7	8.5
62.5	5.2	5.7	6.1	6.7	7.2	7.9	8.6
63.0	5.3	5.8	6.2	6.8	7.4	8.0	8.8
63.5	5.4	5.9	6.4	6.9	7.5	8.2	8.9
64.0	5.5	6.0	6.5	7.0	7.6	8.3	9.1

Length (cm)	–3 SD	–2 SD	–1 SD	Median	1 SD	2 SD	3 SD
64.5	5.6	6.1	6.6	7.1	7.8	8.5	9.3
65.0	5.7	6.2	6.7	7.3	7.9	8.6	9.4
65.5	5.8	6.3	6.8	7.4	8.0	8.7	9.6
66.0	5.9	6.4	6.9	7.5	8.2	8.9	9.7
66.5	6.0	6.5	7.0	7.6	8.3	9.0	9.9
67.0	6.1	6.6	7.1	7.7	8.4	9.2	10.0
67.5	6.2	6.7	7.2	7.9	8.5	9.3	10.2
68.0	6.3	6.8	7.3	8.0	8.7	9.4	10.3
68.5	6.4	6.9	7.5	8.1	8.8	9.6	10.5
69.0	6.5	7.0	7.6	8.2	8.9	9.7	10.6
69.5	6.6	7.1	7.7	8.3	9.0	9.8	10.8
70.0	6.6	7.2	7.8	8.4	9.2	10.0	10.9
70.5	6.7	7.3	7.9	8.5	9.3	10.1	11.1
71.0	6.8	7.4	8.0	8.6	9.4	10.2	11.2
71.5	6.9	7.5	8.1	8.8	9.5	10.4	11.3
72.0	7.0	7.6	8.2	8.9	9.6	10.5	11.5
72.5	7.1	7.6	8.3	9.0	9.8	10.6	11.6
73.0	7.2	7.7	8.4	9.1	9.9	10.8	11.8
73.5	7.2	7.8	8.5	9.2	10.0	10.9	11.9
74.0	7.3	7.9	8.6	9.3	10.1	11.0	12.1
74.5	7.4	8.0	8.7	9.4	10.2	11.2	12.2
75.0	7.5	8.1	8.8	9.5	10.3	11.3	12.3
75.5	7.6	8.2	8.8	9.6	10.4	11.4	12.5
76.0	7.6	8.3	8.9	9.7	10.6	11.5	12.6
76.5	7.7	8.3	9.0	9.8	10.7	11.6	12.7
77.0	7.8	8.4	9.1	9.9	10.8	11.7	12.8
77.5	7.9	8.5	9.2	10.0	10.9	11.9	13.0
78.0	7.9	8.6	9.3	10.1	11.0	12.0	13.1
78.5	8.0	8.7	9.4	10.2	11.1	12.1	13.2
79.0	8.1	8.7	9.5	10.3	11.2	12.2	13.3
79.5	8.2	8.8	9.5	10.4	11.3	12.3	13.4

Length (cm)	–3 SD	–2 SD	–1 SD	Median	1 SD	2 SD	3 SD
80.0	8.2	8.9	9.6	10.4	11.4	12.4	13.6
80.5	8.3	9.0	9.7	10.5	11.5	12.5	13.7
81.0	8.4	9.1	9.8	10.6	11.6	12.6	13.8
81.5	8.5	9.1	9.9	10.7	11.7	12.7	13.9
82.0	8.5	9.2	10.0	10.8	11.8	12.8	14.0
82.5	8.6	9.3	10.1	10.9	11.9	13.0	14.2
83.0	8.7	9.4	10.2	11.0	12.0	13.1	14.3
83.5	8.8	9.5	10.3	11.2	12.1	13.2	14.4
84.0	8.9	9.6	10.4	11.3	12.2	13.3	14.6
84.5	9.0	9.7	10.5	11.4	12.4	13.5	14.7
85.0	9.1	9.8	10.6	11.5	12.5	13.6	14.9
85.5	9.2	9.9	10.7	11.6	12.6	13.7	15.0
86.0	9.3	10.0	10.8	11.7	12.8	13.9	15.2
86.5	9.4	10.1	11.0	11.9	12.9	14.0	15.3
87.0	9.5	10.2	11.1	12.0	13.0	14.2	15.5
87.5	9.6	10.4	11.2	12.1	13.2	14.3	15.6
88.0	9.7	10.5	11.3	12.2	13.3	14.5	15.8
88.5	9.8	10.6	11.4	12.4	13.4	14.6	15.9
89.0	9.9	10.7	11.5	12.5	13.5	14.7	16.1
89.5	10.0	10.8	11.6	12.6	13.7	14.9	16.2
90.0	10.1	10.9	11.8	12.7	13.8	15.0	16.4
90.5	10.2	11.0	11.9	12.8	13.9	15.1	16.5
91.0	10.3	11.1	12.0	13.0	14.1	15.3	16.7
91.5	10.4	11.2	12.1	13.1	14.2	15.4	16.8
92.0	10.5	11.3	12.2	13.2	14.3	15.6	17.0
92.5	10.6	11.4	12.3	13.3	14.4	15.7	17.1
93.0	10.7	11.5	12.4	13.4	14.6	15.8	17.3
93.5	10.7	11.6	12.5	13.5	14.7	16.0	17.4
94.0	10.8	11.7	12.6	13.7	14.8	16.1	17.6
94.5	10.9	11.8	12.7	13.8	14.9	16.3	17.7
95.0	11.0	11.9	12.8	13.9	15.1	16.4	17.9

Length (cm)	–3 SD	–2 SD	–1 SD	Median	1 SD	2 SD	3 SD
95.5	11.1	12.0	12.9	14.0	15.2	16.5	18.0
96.0	11.2	12.1	13.1	14.1	15.3	16.7	18.2
96.5	11.3	12.2	13.2	14.3	15.5	16.8	18.4
97.0	11.4	12.3	13.3	14.4	15.6	17.0	18.5
97.5	11.5	12.4	13.4	14.5	15.7	17.1	18.7
98.0	11.6	12.5	13.5	14.6	15.9	17.3	18.9
98.5	11.7	12.6	13.6	14.8	16.0	17.5	19.1
99.0	11.8	12.7	13.7	14.9	16.2	17.6	19.2
99.5	11.9	12.8	13.9	15.0	16.3	17.8	19.4
100.0	12.0	12.9	14.0	15.2	16.5	18.0	19.6
100.5	12.1	13.0	14.1	15.3	16.6	18.1	19.8
101.0	12.2	13.2	14.2	15.4	16.8	18.3	20.0
101.5	12.3	13.3	14.4	15.6	16.9	18.5	20.2
102.0	12.4	13.4	14.5	15.7	17.1	18.7	20.4
102.5	12.5	13.5	14.6	15.9	17.3	18.8	20.6
103.0	12.6	13.6	14.8	16.0	17.4	19.0	20.8
103.5	12.7	13.7	14.9	16.2	17.6	19.2	21.0
104.0	12.8	13.9	15.0	16.3	17.8	19.4	21.2
104.5	12.9	14.0	15.2	16.5	17.9	19.6	21.5
105.0	13.0	14.1	15.3	16.6	18.1	19.8	21.7
105.5	13.2	14.2	15.4	16.8	18.3	20.0	21.9
106.0	13.3	14.4	15.6	16.9	18.5	20.2	22.1
106.5	13.4	14.5	15.7	17.1	18.6	20.4	22.4
107.0	13.5	14.6	15.9	17.3	18.8	20.6	22.6
107.5	13.6	14.7	16.0	17.4	19.0	20.8	22.8
108.0	13.7	14.9	16.2	17.6	19.2	21.0	23.1
108.5	13.8	15.0	16.3	17.8	19.4	21.2	23.3
109.0	14.0	15.1	16.5	17.9	19.6	21.4	23.6
109.5	14.1	15.3	16.6	18.1	19.8	21.7	23.8
110.0	14.2	15.4	16.8	18.3	20.0	21.9	24.1

Table A5.2.2 Weight-for-length from birth to 2 years: Girls

Length (cm)	–3 SD	–2 SD	–1 SD	Median	1 SD	2 SD	3 SD
45.0	1.9	2.1	2.3	2.5	2.7	3.0	3.3
45.5	2.0	2.1	2.3	2.5	2.8	3.1	3.4
46.0	2.0	2.2	2.4	2.6	2.9	3.2	3.5
46.5	2.1	2.3	2.5	2.7	3.0	3.3	3.6
47.0	2.2	2.4	2.6	2.8	3.1	3.4	3.7
47.5	2.2	2.4	2.6	2.9	3.2	3.5	3.8
48.0	2.3	2.5	2.7	3.0	3.3	3.6	4.0
48.5	2.4	2.6	2.8	3.1	3.4	3.7	4.1
49.0	2.4	2.6	2.9	3.2	3.5	3.8	4.2
49.5	2.5	2.7	3.0	3.3	3.6	3.9	4.3
50.0	2.6	2.8	3.1	3.4	3.7	4.0	4.5
50.5	2.7	2.9	3.2	3.5	3.8	4.2	4.6
51.0	2.8	3.0	3.3	3.6	3.9	4.3	4.8
51.5	2.8	3.1	3.4	3.7	4.0	4.4	4.9
52.0	2.9	3.2	3.5	3.8	4.2	4.6	5.1
52.5	3.0	3.3	3.6	3.9	4.3	4.7	5.2
53.0	3.1	3.4	3.7	4.0	4.4	4.9	5.4
53.5	3.2	3.5	3.8	4.2	4.6	5.0	5.5
54.0	3.3	3.6	3.9	4.3	4.7	5.2	5.7
54.5	3.4	3.7	4.0	4.4	4.8	5.3	5.9
55.0	3.5	3.8	4.2	4.5	5.0	5.5	6.1
55.5	3.6	3.9	4.3	4.7	5.1	5.7	6.3
56.0	3.7	4.0	4.4	4.8	5.3	5.8	6.4
56.5	3.8	4.1	4.5	5.0	5.4	6.0	6.6
57.0	3.9	4.3	4.6	5.1	5.6	6.1	6.8
57.5	4.0	4.4	4.8	5.2	5.7	6.3	7.0
58.0	4.1	4.5	4.9	5.4	5.9	6.5	7.1
58.5	4.2	4.6	5.0	5.5	6.0	6.6	7.3
59.0	4.3	4.7	5.1	5.6	6.2	6.8	7.5
59.5	4.4	4.8	5.3	5.7	6.3	6.9	7.7

Length (cm)	–3 SD	–2 SD	–1 SD	Median	1 SD	2 SD	3 SD
60.0	4.5	4.9	5.4	5.9	6.4	7.1	7.8
60.5	4.6	5.0	5.5	6.0	6.6	7.3	8.0
61.0	4.7	5.1	5.6	6.1	6.7	7.4	8.2
61.5	4.8	5.2	5.7	6.3	6.9	7.6	8.4
62.0	4.9	5.3	5.8	6.4	7.0	7.7	8.5
62.5	5.0	5.4	5.9	6.5	7.1	7.8	8.7
63.0	5.1	5.5	6.0	6.6	7.3	8.0	8.8
63.5	5.2	5.6	6.2	6.7	7.4	8.1	9.0
64.0	5.3	5.7	6.3	6.9	7.5	8.3	9.1
64.5	5.4	5.8	6.4	7.0	7.6	8.4	9.3
65.0	5.5	5.9	6.5	7.1	7.8	8.6	9.5
65.5	5.5	6.0	6.6	7.2	7.9	8.7	9.6
66.0	5.6	6.1	6.7	7.3	8.0	8.8	9.8
66.5	5.7	6.2	6.8	7.4	8.1	9.0	9.9
67.0	5.8	6.3	6.9	7.5	8.3	9.1	10.0
67.5	5.9	6.4	7.0	7.6	8.4	9.2	10.2
68.0	6.0	6.5	7.1	7.7	8.5	9.4	10.3
68.5	6.1	6.6	7.2	7.9	8.6	9.5	10.5
69.0	6.1	6.7	7.3	8.0	8.7	9.6	10.6
69.5	6.2	6.8	7.4	8.1	8.8	9.7	10.7
70.0	6.3	6.9	7.5	8.2	9.0	9.9	10.9
70.5	6.4	6.9	7.6	8.3	9.1	10.0	11.0
71.0	6.5	7.0	7.7	8.4	9.2	10.1	11.1
71.5	6.5	7.1	7.7	8.5	9.3	10.2	11.3
72.0	6.6	7.2	7.8	8.6	9.4	10.3	11.4
72.5	6.7	7.3	7.9	8.7	9.5	10.5	11.5
73.0	6.8	7.4	8.0	8.8	9.6	10.6	11.7
73.5	6.9	7.4	8.1	8.9	9.7	10.7	11.8
74.0	6.9	7.5	8.2	9.0	9.8	10.8	11.9
74.5	7.0	7.6	8.3	9.1	9.9	10.9	12.0
75.0	7.1	7.7	8.4	9.1	10.0	11.0	12.2

Length (cm)	–3 SD	–2 SD	–1 SD	Median	1 SD	2 SD	3 SD
75.5	7.1	7.8	8.5	9.2	10.1	11.1	12.3
76.0	7.2	7.8	8.5	9.3	10.2	11.2	12.4
76.5	7.3	7.9	8.6	9.4	10.3	11.4	12.5
77.0	7.4	8.0	8.7	9.5	10.4	11.5	12.6
77.5	7.4	8.1	8.8	9.6	10.5	11.6	12.8
78.0	7.5	8.2	8.9	9.7	10.6	11.7	12.9
78.5	7.6	8.2	9.0	9.8	10.7	11.8	13.0
79.0	7.7	8.3	9.1	9.9	10.8	11.9	13.1
79.5	7.7	8.4	9.1	10.0	10.9	12.0	13.3
80.0	7.8	8.5	9.2	10.1	11.0	12.1	13.4
80.5	7.9	8.6	9.3	10.2	11.2	12.3	13.5
81.0	8.0	8.7	9.4	10.3	11.3	12.4	13.7
81.5	8.1	8.8	9.5	10.4	11.4	12.5	13.8
82.0	8.1	8.8	9.6	10.5	11.5	12.6	13.9
82.5	8.2	8.9	9.7	10.6	11.6	12.8	14.1
83.0	8.3	9.0	9.8	10.7	11.8	12.9	14.2
83.5	8.4	9.1	9.9	10.9	11.9	13.1	14.4
84.0	8.5	9.2	10.1	11.0	12.0	13.2	14.5
84.5	8.6	9.3	10.2	11.1	12.1	13.3	14.7
85.0	8.7	9.4	10.3	11.2	12.3	13.5	14.9
85.5	8.8	9.5	10.4	11.3	12.4	13.6	15.0
86.0	8.9	9.7	10.5	11.5	12.6	13.8	15.2
86.5	9.0	9.8	10.6	11.6	12.7	13.9	15.4
87.0	9.1	9.9	10.7	11.7	12.8	14.1	15.5
87.5	9.2	10.0	10.9	11.8	13.0	14.2	15.7
88.0	9.3	10.1	11.0	12.0	13.1	14.4	15.9
88.5	9.4	10.2	11.1	12.1	13.2	14.5	16.0
89.0	9.5	10.3	11.2	12.2	13.4	14.7	16.2
89.5	9.6	10.4	11.3	12.3	13.5	14.8	16.4
90.0	9.7	10.5	11.4	12.5	13.7	15.0	16.5
90.5	9.8	10.6	11.5	12.6	13.8	15.1	16.7

Length (cm)	–3 SD	–2 SD	–1 SD	Median	1 SD	2 SD	3 SD
91.0	9.9	10.7	11.7	12.7	13.9	15.3	16.9
91.5	10.0	10.8	11.8	12.8	14.1	15.5	17.0
92.0	10.1	10.9	11.9	13.0	14.2	15.6	17.2
92.5	10.1	11.0	12.0	13.1	14.3	15.8	17.4
93.0	10.2	11.1	12.1	13.2	14.5	15.9	17.5
93.5	10.3	11.2	12.2	13.3	14.6	16.1	17.7
94.0	10.4	11.3	12.3	13.5	14.7	16.2	17.9
94.5	10.5	11.4	12.4	13.6	14.9	16.4	18.0
95.0	10.6	11.5	12.6	13.7	15.0	16.5	18.2
95.5	10.7	11.6	12.7	13.8	15.2	16.7	18.4
96.0	10.8	11.7	12.8	14.0	15.3	16.8	18.6
96.5	10.9	11.8	12.9	14.1	15.4	17.0	18.7
97.0	11.0	12.0	13.0	14.2	15.6	17.1	18.9
97.5	11.1	12.1	13.1	14.4	15.7	17.3	19.1
98.0	11.2	12.2	13.3	14.5	15.9	17.5	19.3
98.5	11.3	12.3	13.4	14.6	16.0	17.6	19.5
99.0	11.4	12.4	13.5	14.8	16.2	17.8	19.6
99.5	11.5	12.5	13.6	14.9	16.3	18.0	19.8
100.0	11.6	12.6	13.7	15.0	16.5	18.1	20.0
100.5	11.7	12.7	13.9	15.2	16.6	18.3	20.2
101.0	11.8	12.8	14.0	15.3	16.8	18.5	20.4
101.5	11.9	13.0	14.1	15.5	17.0	18.7	20.6
102.0	12.0	13.1	14.3	15.6	17.1	18.9	20.8
102.5	12.1	13.2	14.4	15.8	17.3	19.0	21.0
103.0	12.3	13.3	14.5	15.9	17.5	19.2	21.3
103.5	12.4	13.5	14.7	16.1	17.6	19.4	21.5
104.0	12.5	13.6	14.8	16.2	17.8	19.6	21.7
104.5	12.6	13.7	15.0	16.4	18.0	19.8	21.9
105.0	12.7	13.8	15.1	16.5	18.2	20.0	22.2
105.5	12.8	14.0	15.3	16.7	18.4	20.2	22.4
106.0	13.0	14.1	15.4	16.9	18.5	20.5	22.6

Length (cm)	–3 SD	–2 SD	–1 SD	Median	1 SD	2 SD	3 SD
106.5	13.1	14.3	15.6	17.1	18.7	20.7	22.9
107.0	13.2	14.4	15.7	17.2	18.9	20.9	23.1
107.5	13.3	14.5	15.9	17.4	19.1	21.1	23.4
108.0	13.5	14.7	16.0	17.6	19.3	21.3	23.6
108.5	13.6	14.8	16.2	17.8	19.5	21.6	23.9
109.0	13.7	15.0	16.4	18.0	19.7	21.8	24.2
109.5	13.9	15.1	16.5	18.1	20.0	22.0	24.4
110.0	14.0	15.3	16.7	18.3	20.2	22.3	24.7

Table A5.2.3 Weight-for-height from 2 to 5 years: Boys

Height (cm)	–3 SD	–2 SD	–1 SD	Median	1 SD	2 SD	3 SD
65.0	5.9	6.3	6.9	7.4	8.1	8.8	9.6
65.5	6.0	6.4	7.0	7.6	8.2	8.9	9.8
66.0	6.1	6.5	7.1	7.7	8.3	9.1	9.9
66.5	6.1	6.6	7.2	7.8	8.5	9.2	10.1
67.0	6.2	6.7	7.3	7.9	8.6	9.4	10.2
67.5	6.3	6.8	7.4	8.0	8.7	9.5	10.4
68.0	6.4	6.9	7.5	8.1	8.8	9.6	10.5
68.5	6.5	7.0	7.6	8.2	9.0	9.8	10.7
69.0	6.6	7.1	7.7	8.4	9.1	9.9	10.8
69.5	6.7	7.2	7.8	8.5	9.2	10.0	11.0
70.0	6.8	7.3	7.9	8.6	9.3	10.2	11.1
70.5	6.9	7.4	8.0	8.7	9.5	10.3	11.3
71.0	6.9	7.5	8.1	8.8	9.6	10.4	11.4
71.5	7.0	7.6	8.2	8.9	9.7	10.6	11.6
72.0	7.1	7.7	8.3	9.0	9.8	10.7	11.7
72.5	7.2	7.8	8.4	9.1	9.9	10.8	11.8
73.0	7.3	7.9	8.5	9.2	10.0	11.0	12.0
73.5	7.4	7.9	8.6	9.3	10.2	11.1	12.1
74.0	7.4	8.0	8.7	9.4	10.3	11.2	12.2
74.5	7.5	8.1	8.8	9.5	10.4	11.3	12.4

Height (cm)	–3 SD	–2 SD	–1 SD	Median	1 SD	2 SD	3 SD
75.0	7.6	8.2	8.9	9.6	10.5	11.4	12.5
75.5	7.7	8.3	9.0	9.7	10.6	11.6	12.6
76.0	7.7	8.4	9.1	9.8	10.7	11.7	12.8
76.5	7.8	8.5	9.2	9.9	10.8	11.8	12.9
77.0	7.9	8.5	9.2	10.0	10.9	11.9	13.0
77.5	8.0	8.6	9.3	10.1	11.0	12.0	13.1
78.0	8.0	8.7	9.4	10.2	11.1	12.1	13.3
78.5	8.1	8.8	9.5	10.3	11.2	12.2	13.4
79.0	8.2	8.8	9.6	10.4	11.3	12.3	13.5
79.5	8.3	8.9	9.7	10.5	11.4	12.4	13.6
80.0	8.3	9.0	9.7	10.6	11.5	12.6	13.7
80.5	8.4	9.1	9.8	10.7	11.6	12.7	13.8
81.0	8.5	9.2	9.9	10.8	11.7	12.8	14.0
81.5	8.6	9.3	10.0	10.9	11.8	12.9	14.1
82.0	8.7	9.3	10.1	11.0	11.9	13.0	14.2
82.5	8.7	9.4	10.2	11.1	12.1	13.1	14.4
83.0	8.8	9.5	10.3	11.2	12.2	13.3	14.5
83.5	8.9	9.6	10.4	11.3	12.3	13.4	14.6
84.0	9.0	9.7	10.5	11.4	12.4	13.5	14.8
84.5	9.1	9.9	10.7	11.5	12.5	13.7	14.9
85.0	9.2	10.0	10.8	11.7	12.7	13.8	15.1
85.5	9.3	10.1	10.9	11.8	12.8	13.9	15.2
86.0	9.4	10.2	11.0	11.9	12.9	14.1	15.4
86.5	9.5	10.3	11.1	12.0	13.1	14.2	15.5
87.0	9.6	10.4	11.2	12.2	13.2	14.4	15.7
87.5	9.7	10.5	11.3	12.3	13.3	14.5	15.8
88.0	9.8	10.6	11.5	12.4	13.5	14.7	16.0
88.5	9.9	10.7	11.6	12.5	13.6	14.8	16.1
89.0	10.0	10.8	11.7	12.6	13.7	14.9	16.3
89.5	10.1	10.9	11.8	12.8	13.9	15.1	16.4
90.0	10.2	11.0	11.9	12.9	14.0	15.2	16.6

Height (cm)	–3 SD	–2 SD	–1 SD	Median	1 SD	2 SD	3 SD
90.5	10.3	11.1	12.0	13.0	14.1	15.3	16.7
91.0	10.4	11.2	12.1	13.1	14.2	15.5	16.9
91.5	10.5	11.3	12.2	13.2	14.4	15.6	17.0
92.0	10.6	11.4	12.3	13.4	14.5	15.8	17.2
92.5	10.7	11.5	12.4	13.5	14.6	15.9	17.3
93.0	10.8	11.6	12.6	13.6	14.7	16.0	17.5
93.5	10.9	11.7	12.7	13.7	14.9	16.2	17.6
94.0	11.0	11.8	12.8	13.8	15.0	16.3	17.8
94.5	11.1	11.9	12.9	13.9	15.1	16.5	17.9
95.0	11.1	12.0	13.0	14.1	15.3	16.6	18.1
95.5	11.2	12.1	13.1	14.2	15.4	16.7	18.3
96.0	11.3	12.2	13.2	14.3	15.5	16.9	18.4
96.5	11.4	12.3	13.3	14.4	15.7	17.0	18.6
97.0	11.5	12.4	13.4	14.6	15.8	17.2	18.8
97.5	11.6	12.5	13.6	14.7	15.9	17.4	18.9
98.0	11.7	12.6	13.7	14.8	16.1	17.5	19.1
98.5	11.8	12.8	13.8	14.9	16.2	17.7	19.3
99.0	11.9	12.9	13.9	15.1	16.4	17.9	19.5
99.5	12.0	13.0	14.0	15.2	16.5	18.0	19.7
100.0	12.1	13.1	14.2	15.4	16.7	18.2	19.9
100.5	12.2	13.2	14.3	15.5	16.9	18.4	20.1
101.0	12.3	13.3	14.4	15.6	17.0	18.5	20.3
101.5	12.4	13.4	14.5	15.8	17.2	18.7	20.5
102.0	12.5	13.6	14.7	15.9	17.3	18.9	20.7
102.5	12.6	13.7	14.8	16.1	17.5	19.1	20.9
103.0	12.8	13.8	14.9	16.2	17.7	19.3	21.1
103.5	12.9	13.9	15.1	16.4	17.8	19.5	21.3
104.0	13.0	14.0	15.2	16.5	18.0	19.7	21.6
104.5	13.1	14.2	15.4	16.7	18.2	19.9	21.8
105.0	13.2	14.3	15.5	16.8	18.4	20.1	22.0
105.5	13.3	14.4	15.6	17.0	18.5	20.3	22.2

Height (cm)	–3 SD	–2 SD	–1 SD	Median	1 SD	2 SD	3 SD
106.0	13.4	14.5	15.8	17.2	18.7	20.5	22.5
106.5	13.5	14.7	15.9	17.3	18.9	20.7	22.7
107.0	13.7	14.8	16.1	17.5	19.1	20.9	22.9
107.5	13.8	14.9	16.2	17.7	19.3	21.1	23.2
108.0	13.9	15.1	16.4	17.8	19.5	21.3	23.4
108.5	14.0	15.2	16.5	18.0	19.7	21.5	23.7
109.0	14.1	15.3	16.7	18.2	19.8	21.8	23.9
109.5	14.3	15.5	16.8	18.3	20.0	22.0	24.2
110.0	14.4	15.6	17.0	18.5	20.2	22.2	24.4
110.5	14.5	15.8	17.1	18.7	20.4	22.4	24.7
111.0	14.6	15.9	17.3	18.9	20.7	22.7	25.0
111.5	14.8	16.0	17.5	19.1	20.9	22.9	25.2
112.0	14.9	16.2	17.6	19.2	21.1	23.1	25.5
112.5	15.0	16.3	17.8	19.4	21.3	23.4	25.8
113.0	15.2	16.5	18.0	19.6	21.5	23.6	26.0
113.5	15.3	16.6	18.1	19.8	21.7	23.9	26.3
114.0	15.4	16.8	18.3	20.0	21.9	24.1	26.6
114.5	15.6	16.9	18.5	20.2	22.1	24.4	26.9
115.0	15.7	17.1	18.6	20.4	22.4	24.6	27.2
115.5	15.8	17.2	18.8	20.6	22.6	24.9	27.5
116.0	16.0	17.4	19.0	20.8	22.8	25.1	27.8
116.5	16.1	17.5	19.2	21.0	23.0	25.4	28.0
117.0	16.2	17.7	19.3	21.2	23.3	25.6	28.3
117.5	16.4	17.9	19.5	21.4	23.5	25.9	28.6
118.0	16.5	18.0	19.7	21.6	23.7	26.1	28.9
118.5	16.7	18.2	19.9	21.8	23.9	26.4	29.2
119.0	16.8	18.3	20.0	22.0	24.1	26.6	29.5
119.5	16.9	18.5	20.2	22.2	24.4	26.9	29.8
120.0	17.1	18.6	20.4	22.4	24.6	27.2	30.1

Table A5.2.4 Weight-for-height from 2 to 5 years: Girls

Height (cm)	–3 SD	–2 SD	–1 SD	Median	1 SD	2 SD	3 SD
65.0	5.6	6.1	6.6	7.2	7.9	8.7	9.7
65.5	5.7	6.2	6.7	7.4	8.1	8.9	9.8
66.0	5.8	6.3	6.8	7.5	8.2	9.0	10.0
66.5	5.8	6.4	6.9	7.6	8.3	9.1	10.1
67.0	5.9	6.4	7.0	7.7	8.4	9.3	10.2
67.5	6.0	6.5	7.1	7.8	8.5	9.4	10.4
68.0	6.1	6.6	7.2	7.9	8.7	9.5	10.5
68.5	6.2	6.7	7.3	8.0	8.8	9.7	10.7
69.0	6.3	6.8	7.4	8.1	8.9	9.8	10.8
69.5	6.3	6.9	7.5	8.2	9.0	9.9	10.9
70.0	6.4	7.0	7.6	8.3	9.1	10.0	11.1
70.5	6.5	7.1	7.7	8.4	9.2	10.1	11.2
71.0	6.6	7.1	7.8	8.5	9.3	10.3	11.3
71.5	6.7	7.2	7.9	8.6	9.4	10.4	11.5
72.0	6.7	7.3	8.0	8.7	9.5	10.5	11.6
72.5	6.8	7.4	8.1	8.8	9.7	10.6	11.7
73.0	6.9	7.5	8.1	8.9	9.8	10.7	11.8
73.5	7.0	7.6	8.2	9.0	9.9	10.8	12.0
74.0	7.0	7.6	8.3	9.1	10.0	11.0	12.1
74.5	7.1	7.7	8.4	9.2	10.1	11.1	12.2
75.0	7.2	7.8	8.5	9.3	10.2	11.2	12.3
75.5	7.2	7.9	8.6	9.4	10.3	11.3	12.5
76.0	7.3	8.0	8.7	9.5	10.4	11.4	12.6
76.5	7.4	8.0	8.7	9.6	10.5	11.5	12.7
77.0	7.5	8.1	8.8	9.6	10.6	11.6	12.8
77.5	7.5	8.2	8.9	9.7	10.7	11.7	12.9
78.0	7.6	8.3	9.0	9.8	10.8	11.8	13.1
78.5	7.7	8.4	9.1	9.9	10.9	12.0	13.2
79.0	7.8	8.4	9.2	10.0	11.0	12.1	13.3
79.5	7.8	8.5	9.3	10.1	11.1	12.2	13.4

Height (cm)	–3 SD	–2 SD	–1 SD	Median	1 SD	2 SD	3 SD
80.0	7.9	8.6	9.4	10.2	11.2	12.3	13.6
80.5	8.0	8.7	9.5	10.3	11.3	12.4	13.7
81.0	8.1	8.8	9.6	10.4	11.4	12.6	13.9
81.5	8.2	8.9	9.7	10.6	11.6	12.7	14.0
82.0	8.3	9.0	9.8	10.7	11.7	12.8	14.1
82.5	8.4	9.1	9.9	10.8	11.8	13.0	14.3
83.0	8.5	9.2	10.0	10.9	11.9	13.1	14.5
83.5	8.5	9.3	10.1	11.0	12.1	13.3	14.6
84.0	8.6	9.4	10.2	11.1	12.2	13.4	14.8
84.5	8.7	9.5	10.3	11.3	12.3	13.5	14.9
85.0	8.8	9.6	10.4	11.4	12.5	13.7	15.1
85.5	8.9	9.7	10.6	11.5	12.6	13.8	15.3
86.0	9.0	9.8	10.7	11.6	12.7	14.0	15.4
86.5	9.1	9.9	10.8	11.8	12.9	14.2	15.6
87.0	9.2	10.0	10.9	11.9	13.0	14.3	15.8
87.5	9.3	10.1	11.0	12.0	13.2	14.5	15.9
88.0	9.4	10.2	11.1	12.1	13.3	14.6	16.1
88.5	9.5	10.3	11.2	12.3	13.4	14.8	16.3
89.0	9.6	10.4	11.4	12.4	13.6	14.9	16.4
89.5	9.7	10.5	11.5	12.5	13.7	15.1	16.6
90.0	9.8	10.6	11.6	12.6	13.8	15.2	16.8
90.5	9.9	10.7	11.7	12.8	14.0	15.4	16.9
91.0	10.0	10.9	11.8	12.9	14.1	15.5	17.1
91.5	10.1	11.0	11.9	13.0	14.3	15.7	17.3
92.0	10.2	11.1	12.0	13.1	14.4	15.8	17.4
92.5	10.3	11.2	12.1	13.3	14.5	16.0	17.6
93.0	10.4	11.3	12.3	13.4	14.7	16.1	17.8
93.5	10.5	11.4	12.4	13.5	14.8	16.3	17.9
94.0	10.6	11.5	12.5	13.6	14.9	16.4	18.1
94.5	10.7	11.6	12.6	13.8	15.1	16.6	18.3
95.0	10.8	11.7	12.7	13.9	15.2	16.7	18.5

Height (cm)	–3 SD	–2 SD	–1 SD	Median	1 SD	2 SD	3 SD
95.5	10.8	11.8	12.8	14.0	15.4	16.9	18.6
96.0	10.9	11.9	12.9	14.1	15.5	17.0	18.8
96.5	11.0	12.0	13.1	14.3	15.6	17.2	19.0
97.0	11.1	12.1	13.2	14.4	15.8	17.4	19.2
97.5	11.2	12.2	13.3	14.5	15.9	17.5	19.3
98.0	11.3	12.3	13.4	14.7	16.1	17.7	19.5
98.5	11.4	12.4	13.5	14.8	16.2	17.9	19.7
99.0	11.5	12.5	13.7	14.9	16.4	18.0	19.9
99.5	11.6	12.7	13.8	15.1	16.5	18.2	20.1
100.0	11.7	12.8	13.9	15.2	16.7	18.4	20.3
100.5	11.9	12.9	14.1	15.4	16.9	18.6	20.5
101.0	12.0	13.0	14.2	15.5	17.0	18.7	20.7
101.5	12.1	13.1	14.3	15.7	17.2	18.9	20.9
102.0	12.2	13.3	14.5	15.8	17.4	19.1	21.1
102.5	12.3	13.4	14.6	16.0	17.5	19.3	21.4
103.0	12.4	13.5	14.7	16.1	17.7	19.5	21.6
103.5	12.5	13.6	14.9	16.3	17.9	19.7	21.8
104.0	12.6	13.8	15.0	16.4	18.1	19.9	22.0
104.5	12.8	13.9	15.2	16.6	18.2	20.1	22.3
105.0	12.9	14.0	15.3	16.8	18.4	20.3	22.5
105.5	13.0	14.2	15.5	16.9	18.6	20.5	22.7
106.0	13.1	14.3	15.6	17.1	18.8	20.8	23.0
106.5	13.3	14.5	15.8	17.3	19.0	21.0	23.2
107.0	13.4	14.6	15.9	17.5	19.2	21.2	23.5
107.5	13.5	14.7	16.1	17.7	19.4	21.4	23.7
108.0	13.7	14.9	16.3	17.8	19.6	21.7	24.0
108.5	13.8	15.0	16.4	18.0	19.8	21.9	24.3
109.0	13.9	15.2	16.6	18.2	20.0	22.1	24.5
109.5	14.1	15.4	16.8	18.4	20.3	22.4	24.8
110.0	14.2	15.5	17.0	18.6	20.5	22.6	25.1
110.5	14.4	15.7	17.1	18.8	20.7	22.9	25.4

Height (cm)	–3 SD	–2 SD	–1 SD	Median	1 SD	2 SD	3 SD
111.0	14.5	15.8	17.3	19.0	20.9	23.1	25.7
111.5	14.7	16.0	17.5	19.2	21.2	23.4	26.0
112.0	14.8	16.2	17.7	19.4	21.4	23.6	26.2
112.5	15.0	16.3	17.9	19.6	21.6	23.9	26.5
113.0	15.1	16.5	18.0	19.8	21.8	24.2	26.8
113.5	15.3	16.7	18.2	20.0	22.1	24.4	27.1
114.0	15.4	16.8	18.4	20.2	22.3	24.7	27.4
114.5	15.6	17.0	18.6	20.5	22.6	25.0	27.8
115.0	15.7	17.2	18.8	20.7	22.8	25.2	28.1
115.5	15.9	17.3	19.0	20.9	23.0	25.5	28.4
116.0	16.0	17.5	19.2	21.1	23.3	25.8	28.7
116.5	16.2	17.7	19.4	21.3	23.5	26.1	29.0
117.0	16.3	17.8	19.6	21.5	23.8	26.3	29.3
117.5	16.5	18.0	19.8	21.7	24.0	26.6	29.6
118.0	16.6	18.2	19.9	22.0	24.2	26.9	29.9
118.5	16.8	18.4	20.1	22.2	24.5	27.2	30.3
119.0	16.9	18.5	20.3	22.4	24.7	27.4	30.6
119.5	17.1	18.7	20.5	22.6	25.0	27.7	30.9
120.0	17.3	18.9	20.7	22.8	25.2	28.0	31.2

Notes

ANNEX 6

Job aids and charts

A pocket book does not allow the reproduction in a readable size of job aids and charts that people might find useful in their daily work. Several job aids can be found in the manual *Management of the child with a serious infection or severe malnutrition* (**http://www.who.int/maternal_child_adolescent/documents/fch_cah_00_1/en/**). In addition, the charts listed below can be downloaded in PDF format from the website of the WHO Department of Maternal, Newborn, Child and Adolescent Health and Development (**http://www.who.int/maternal_child_adolescent/en/**):

- Monitoring chart
- Mother's card
- Weight chart
- 24-h food intake chart
- Daily ward feed chart

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ANTIMICROBIAL DRUGS FOR COMMON CONDITIONS

Please fill the blanks with your country's most recent updated treatment guidelines. Page numbers refer to where generic guidance is found in the Pocket Book.

Condition	Drug	Dose
Dysentery (p. 144)		
HIV treatment (p. 233)		
drug 2		
drug 3		
Malaria, non severe (p. 164–5)		
drug 2		
Malaria, severe (p. 158)		
Mastoiditis (p. 182)		
drug 2		
Meningitis (p. 169)		
drug 2		
Osteomyelitis (p. 187)		
drug 2		
Otitis media, acute (p. 183)		
Pneumonia, non-severe (p. 86)		
Pneumonia, severe (p. 82)		
drug 2		
Sepsis, neonatal (p. 55)		
drug 2		
Sepsis, older child (p. 180)		
drug 2		
Severe acute malnutrition,		
uncomplicated (p. 207)		
complicated (p. 207)		
drug 2		
drug 3		
Tuberculosis (p.116-7)		
drug 2		
drug 3		
drug 4		
Typhoid fever (p. 181)		
drug 2		
Urinary tract infection (p. 185)		
drug 2		

DAILY MONITORING CHART

Date: **Hospital Record number:**

1. Child's name: **Mother's name:**

Age: Weight on admission:

2. Diagnoses: **Main problems:**

1)

2)

3)

4)

	DAY 1				DAY 2				DAY 3				DAY 4			
3. Vital signs																
• Consciousness level (AVPU)																
• Temperature																
• Respiratory rate																
• Pulse rate																
4. Fluid balance (record volumes and times)																
IV																
By nasogastric tube																
Oral																
Fluid output																
5. Treatments given (sign on chart when given)																
Name of treatment:	Dose:															
1)																
2)																
3)																
4)																
6. Feeding/Nutrition																
Child breastfed																
Drink taken																
Food taken																
Feeding problems (give details)																
Weight																

7. Outcome (circle one of the following): Discharged well / Absconded / Transferred / Died

EMERGENCY DRUGS

Adrenaline:

- *Anaphylaxis* – 0.15 ml of 1:1000 solution IM (0.3 ml for children > 6 years) (p. 109)
- *Severe croup* – nebulize with 0.5 ml/kg of 1:1000 solution (maximum dose: 5 ml) (p. 104)
- *Severe wheeze* – 0.01 ml/kg of 1:1000 solution SC (maximum dose: 0.3 ml) (p. 99)

Glucose: 5 ml/kg of 10% glucose solution rapidly by IV injection (p. 16)

Oxygen: 1–2 l/min by nasal prongs (p. 11)

Diazepam (for convulsions): Rectal: 0.5 mg/kg, IV: 0.2–0.3 mg/kg (p. 15)

INTRAVENOUS FLUIDS

Type of intravenous fluid	Composition						
	Na+ mmol/l	K+ mmol/l	Cl– mmol/l	Ca++ mmol/l	Lactate mmol/l	Glucose g/l	Calories cal/l
Ringer's lactate (Hartmann's)	130	5.4	112	1.8	27	–	–
Normal saline (0.9% NaCl)	154	–	154	–	–	–	–
5% glucose[a]	–	–	–	–	–	50	200
10% glucose	–	–	–	–	–	100	400
0.45 NaCl/5% glucose	77	–	77	–	–	50	200
Darrow's solution	121	35	103	–	53	–	–
Half-strength Darrow's with 5% glucose[b]	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[a]	31	–	31	–	–	40	160

[a] These fluids can be used mainly in the first few days of life but not in other infants or children.

[b] Half-strength Darrow's solution often comes without glucose, and glucose must be added before use.

The *Pocket Book* is for use by doctors, nurses and other health workers who are responsible for the care of young children at the first level referral hospitals. This second edition is based on evidence from several WHO updated and published clinical guidelines. It is for use in both inpatient and outpatient care in small hospitals with basic laboratory facilities and essential medicines. In some settings, these guidelines can be used in any facilities where sick children are admitted for inpatient care.

The *Pocket Book* is one of a series of documents and tools that support the Integrated Management of Childhood Illness (IMCI). The guidelines require the hospital to have (1) the capacity to carry out certain essential investigations, such as pulse oximetry, blood glucose, blood smear examinations for malaria parasites, estimation of haemoglobin, packed cell volume and full blood count, blood group and cross-match, and basic microscopy of cerebrospinal fluid and urine; and where possible blood and urine culture, ultrasound and basic x-rays; (2) essential medicines for the care of seriously ill children. Advanced and high care treatment options, such as intensive care or mechanical ventilation, are not described.

These guidelines focus on the management of the major causes of childhood mortality in most developing countries, such as newborn problems, pneumonia, diarrhoea, malaria, meningitis, septicaemia, measles and related conditions, severe acute malnutrition and paediatric HIV/AIDS. It also covers some common surgical conditions that can be managed in small hospitals.

Details of the evidence on which the *Pocket Book* is based can be found on WHO website from the published guidelines provided in the bibliography. These guidelines are applicable in most areas of the world and may be adapted to suit country specific circumstances. The online version will be updated regularly as new evidence emerges.

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