

PHC Chapter 3: Nutrition and Anaemia

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3.1 ANAEMIA

DESCRIPTION

A condition characterised by low haemoglobin (Hb), clinically recognised by pallor, tiredness, shortness of breath.

It is commonly caused by:

- » Nutritional deficiency of iron or folate or vitamin B12.
- » Chronic systemic diseases such as HIV, TB, malignancy.
- » Blood loss (bleeding/haemorrhage) e.g. caused by parasites, ulcers, tumours, abnormal menstruation.

Other causes include:

- » Infiltration or replacement of the bone marrow.
- » Abnormal Hb or red cells.
- » Haemolysis.

DIAGNOSIS

Age/gender category	Hb less than:
women	12 g/dL; 11 g/dL in pregnancy
men	13 g/dL
children 1–5 years of age	10 g/dL
children >5 years of age	11 g/dL

Children < 5 years of age

Anaemia is most often due to iron deficiency. See Section 3.1.1: Anaemia, iron deficiency.

Children > 5 years of age and adults

Request a full blood count.

- » If MCV is normal (normocytic):
 - then systemic disease or haemolysis are likely causes.
- » If MCV is low (microcytic):
 - then iron deficiency is the most likely cause.
- » If MCV is high (macrocytic):
 - then folate and/or vitamin B12 deficiency is the most likely cause.

Pregnant women

See Section 6.4.3: Anaemia in pregnancy.

REFERRAL

- » Unknown cause.
- » Symptomatic anaemia e.g. palpitations and shortness of breath.
- » Evidence of cardiac failure.
- » Signs of chronic disease (investigate for HIV and TB before referral).
- » Anaemia associated with enlargement of the liver, spleen or lymph nodes.
- » Evidence of acute blood loss or bleeding disorder.
- » Menorrhagia or dysfunctional uterine bleeding.
- » Blood in stool, or melaena.
- » Pregnant women > 34 weeks of gestation and Hb < 7 g/dL.
- » Children with Hb ≤ 7 g/dL (If Hb cannot be done, look for severe palmar pallor).
- » Anaemia associated with other abnormalities on FBC or smear.

- » No improvement despite correct treatment.

3.1.1 ANAEMIA, IRON DEFICIENCY

D50.0/D50.8/D50.9

DESCRIPTION

A common cause of anaemia in young children and women of childbearing age. A full blood count showing a low MCV suggests the diagnosis of iron deficiency anaemia. A full blood count is not required for children, unless referral criteria above are present.

Note: Iron deficiency anaemia in children > 5 years of age, adult males and non-menstruating women, is generally due to occult or overt blood loss. Refer all cases for investigation and treatment of the underlying cause.

GENERAL MEASURES

- » Identify and treat the cause.
- » Exclude other causes. See referral criteria in Section 3.1: Anaemia.
- » Dietary advice:
 - Avoid drinking tea/coffee with meals.
 - Increase vitamin C intake (e.g. citrus fruit, orange juice, broccoli, cauliflower, guavas, strawberries) with meals to increase iron absorption from the diet.
- » Increase dietary intake of iron. Foods rich in iron include: liver, kidney, beef, dried beans and peas, green leafy vegetables, fortified wholegrain breads, cereals.

MEDICINE TREATMENT

Treatment

Treat the underlying cause.

Children < 5 years of age

- Iron, oral, 1–2 mg/kg/dose of elemental iron 8 hourly with meals.
 - Follow up Hb after 14 days.
 - Hb lower than before: refer.
 - Hb the same/higher: continue treatment and repeat after another 28 days.
 - Continue treatment for 3 months after Hb normalises.

Empiric treatment for worms (this will not treat tapeworm)

- Mebendazole, oral.
 - Children 1–2 years: 100 mg 12 hourly for 3 days.
 - Children > 2–5 years: 500 mg as a single dose.

OR

- Albendazole, oral, single dose.
 - Children 1–2 years: 200 mg as a single dose.
 - Children ≥ 2 years and adults: 400 mg as a single dose.

LoE:IIIb¹

Adults

- Ferrous sulfate compound BPC (dried), oral, 170 mg (± 55 mg elemental iron) 12 hourly with meals.

LoE:IIIb²

OR

- Ferrous fumarate, oral, 200 mg (\pm 65 mg elemental iron) 12 hourly.
 - Do not ingest with tea, antacids or calcium supplements/milk.
 - Doses should be taken on an empty stomach, but if gastrointestinal side effects occur doses should be taken with meals
 - Continue with treatment for 3–6 months once Hb has normalised to replace iron stores.

Follow the patient after one month of treatment and Hb should rise by at least 2 g/dL in 4 weeks in the adherent patient without ongoing blood loss.

If daily iron is poorly tolerated (e.g. epigastric pain, nausea, vomiting and constipation), intermittent iron supplementation may be administered:

- Ferrous sulphate compound BPC (dried), oral, 340 mg per week, (\pm 110 mg elemental iron), with meals.

OR

- Ferrous fumarate, oral, 400 mg per week (\pm 130 mg elemental iron).

LoE: IVb ³

Pregnant women

See Section 6.4.3: Anaemia in pregnancy.

Consider the following if there is failure to respond to iron therapy:

- » non-adherence,
- » continued blood loss,
- » wrong diagnosis,
- » malabsorption, or
- » mixed deficiency; concurrent folate or vitamin B12 deficiency.

LoE: IVb ⁴

Prophylaxis

Infants from 6 weeks (Z29.2)

If < 2.5 kg at birth:

- Ferrous lactate, oral, 0.6 mL daily (provides \pm 15 mg elemental iron) until 6 months of age.

OR

- Ferrous gluconate syrup, oral, 2.5 mL daily (provides \pm 15 mg elemental iron) until 6 months of age.

LoE: IIIb ⁵

Pregnant women

See Section 6.4.1: Antenatal supplements.

Elemental iron per preparation

Ferrous gluconate elixir	350 mg/5 mL	40 mg elemental iron per 5 mL	8 mg elemental iron per mL
Ferrous gluconate syrup	250 mg/5 mL	30 mg elemental iron per 5 mL	6 mg elemental iron per mL
Ferrous lactate drops	25 mg/mL	25 mg elemental iron per mL	1 mg elemental iron per 0.04 mL
Ferrous sulphate compound BPC (dried) tablets	170 mg	± 55 mg elemental iron per tablet	
Ferrous fumarate	200 mg	± 65 mg elemental iron per tablet	

LoE:IVb⁶**CAUTION**

Iron is extremely toxic in overdose, particularly in children.
Store all medication out of reach of children.

REFERRAL

- » As in Section 3.1: Anaemia.
- » Children > 5 years of age, men and non-menstruating women.
- » No or inadequate response to treatment.

3.1.2 ANAEMIA, MACROCYTIC OR MEGALOBLASTIC

D52.0/D52.1/D52.8/D52.9/D53.1

DESCRIPTION

Anaemia with large red blood cells is commonly due to folate or vitamin B₁₂ deficiency.

Folate deficiency is common in pregnant women and in the postpartum period, and in alcoholics. Macrocytic anaemia in these patients can be assumed to be due to folate deficiency and does not require further investigation. See Section 6.4.3: Anaemia in pregnancy.

Vitamin B₁₂ deficiency occurs mainly in middle-aged or older adults, and can cause neurological damage if not treated.

Macrocytic anaemia outside of pregnancy or the postpartum period requires further investigations to establish the cause.

INVESTIGATIONS

FBC will confirm macrocytic anaemia.

- » MCV will be elevated.
- » White cell count and/or platelet count may also be reduced.

If there is a poor response to folate, measure serum vitamin B₁₂.

Note: Zidovudine and stavudine cause elevated MCV. Zidovudine often causes anaemia and/or decreased white cell count. It is not necessary to measure folate and B₁₂ if the patient is not anaemic.

GENERAL MEASURES

- » Dietary advice: Increase intake of folic acid rich foods such as:
 - Liver, eggs, fortified breakfast cereals, citrus fruit, spinach and other green vegetables, lentils, dry beans, peanuts.
 - Reduce alcohol intake.
- » Vitamin B₁₂ deficiency anaemia:
 - High protein diet is recommended (1.5g/kg/day).
 - Increase intake of dietary vitamin B₁₂ sources, including meat (especially liver), eggs and dairy products.

MEDICINE TREATMENTFolic acid deficiency:

- Folic acid, oral, 5 mg daily until Hb is normal.
 - Check Hb monthly.

Folic acid given to patients with vitamin B12 deficiency can mask vitamin B12 deficiency and lead to neurological damage, unless vitamin B12 is also given.

REFERRAL

- » Patients with suspected B12 deficiency.
- » Chronic diarrhoea.
- » Poor response within a month of treatment.
- » Macrocytic anaemia of unknown cause.

3.2 CHILDHOOD MALNUTRITION, INCLUDING NOT GROWING WELL/ GROWTH FALTERING

E40/E41/E42/E43/E44.0/E44.1/E45/E46

In all children, check for malnutrition and anaemia:

- » Plot the weight on the Road to Health chart/booklet.
- » Look at the shape of the weight curve:
 - Is the weight curve rising parallel to the reference lines?
- OR**
- is it flattening?
- OR**
- is there weight loss?
- » Look for visible wasting.
- » Look and feel for oedema of both feet.
- » Look for palmar pallor.
- » Check Hb if anaemia is suspected.

3.2.1 SEVERE ACUTE MALNUTRITION (SAM)

E40/E41/E42/E43

DESCRIPTION

Diagnostic criteria for SAM in children aged 6–60 months (any one of the following):

Indicator	Measure	Cut-off
Severe wasting	Weight-for-Height z-score (WHZ)	< -3
	Mid Upper Arm Circumference (MUAC)	< 11.5 cm
Bilateral nutritional oedema	Clinical signs of nutritional oedema*	

Where a suitable measuring device is not available the following less sensitive findings would also indicate the need to manage as severe acute malnutrition:

- » **Severe underweight**
 - WHZ < -3 (usually clinically reflective of marasmus) where no other explanation is present, and/or
 - clinically severe wasting (usually clinically reflective of marasmus – thin arms, thin legs, “old man” appearance, baggy pants folds around buttocks, wasted buttocks).
- » **Nutritional oedema*** supported by findings of skin changes, fine pale sparse hair, enlarged smooth soft liver, moon face.

Exception

Babies who were premature and are growing parallel to or better than the z-score lines, should not be classified as failure to thrive or not growing well.

3.2.1.1 COMPLICATED SAM

E40/E41/E42/E43

DESCRIPTION

Any child with SAM who has any **ONE** of the following features:

- » < 6 months of age or weighs < 4 kg.
- » Pitting oedema.
- » Refusing feeds or is not eating well.
- » Any of the danger signs listed below.

Danger Signs

- | | |
|---|-----------------|
| - dehydration | - hypoglycaemia |
| - vomiting | - hypothermia |
| - respiratory distress (including fast breathing) | - convulsions |
| - not able to feed | - shock |
| - lethargy (not alert) | - jaundice |
| - weeping skin lesions | - bleeding |

All children with complicated SAM are at risk of complications or death.

Refer urgently!

Stabilise before referral.

Initiate treatment while waiting for transport to hospital.

GENERAL MEASURES

- » Keep the child warm.
- » Test for and prevent hypoglycaemia in all children.

If the child is able to swallow:

- If breastfed: ask the mother to breastfeed the child, or give expressed breastmilk.
- If not breastfed: give a 30–50 mL of a stabilising feed (F-75) or a breastmilk substitute before the child is referred.
- If no F-75 or breastmilk substitute is available, give 30–50 mL of sugar water. To make sugar water: Dissolve 4 level teaspoons of sugar (20 g) in a 200 mL cup of clean water.
- Repeat 2 hourly until the child reaches hospital.

If the child is not able to swallow:

- Insert a nasogastric tube and check the position of the tube.
- Give 50 mL of breastmilk, F-75, breastmilk substitute or sugar water by nasogastric tube (as above).
- Repeat 2 hourly until the child reaches hospital.

If blood sugar < 3 mmol/L treat with:

- 10% Glucose:
 - Nasogastric tube: 10 mL/kg.
 - Intravenous line: 2 mL/kg.

CAUTION

In malnutrition, if IV fluids are required for severe dehydration/shock, give sodium chloride 0.9%, 10 mL/kg/hour and monitor for volume overload. Once stable continue with ORS orally or by nasogastric tube

MEDICINE TREATMENT

Note: Signs of infection such as fever are usually absent. Treat infection while awaiting transfer. If there are no danger signs, give 1st dose while arranging referral to hospital:

- Amoxicillin, oral, 45 mg/kg as a single dose. See Chp 23: Standard paediatric dosing tables.

If the child has any danger signs:

- Ceftriaxone, IM, 80 mg/kg/dose immediately as a single dose and refer. See Chp 23: Standard paediatric dosing tables.
 - Do not inject more than 1 g at one injection site.

CAUTION: USE OF CEFTRIAXONE IN NEONATES AND CHILDREN

- » If SUSPECTING SERIOUS BACTERIAL INFECTION in neonate, give ceftriaxone, even if jaundiced.
- » Avoid giving calcium-containing IV fluids (e.g. Ringer Lactate) together with ceftriaxone:
 - If ≤ 28 days old, avoid calcium-containing IV fluids for 48 hours after ceftriaxone administered.
 - If >28 days old, ceftriaxone and calcium-containing IV fluids may be given sequentially provided the giving set is flushed thoroughly with sodium chloride 0.9% before and after.
 - Preferably administer IV fluids without calcium contents.
- » Always include the dose and route of administration of ceftriaxone in the referral letter.

Give an additional dose of Vitamin A:

- Vitamin A (retinol), oral.

Age range	Dose Units	Capsule 100 000 IU	Capsule 200 000 IU
Infants 6–11 months	100 000	1 capsule	–
Children 12 months–5 years	200 000	2 capsules	1 capsule

3.2.1.2 UNCOMPLICATED SAM

E43

DESCRIPTION

Children with SAM who meet the following criteria:

- » The child is > 6 months of age and weight > 4 kg, and
- » There is no pitting oedema, and
- » The child is alert (not lethargic), and
- » The child has a good appetite and is feeding well, and
- » The child does not have any danger signs or severe classification (and does not require referral for another reason).

All cases require careful assessment for possible TB or HIV.

GENERAL MEASURES

- » Provide RTUF and/or other nutritional supplements according to supplementation guidelines.
- » Counsel according to IMCI guidelines.
- » Regular follow-up to ensure that the child gains weight and remains well.
- » Discharge with supplementation, once the following criteria are met:
 - WHZ (weight-for-height z-score): > -2 WHZ for two consecutive visits at least one month apart and/or
 - MUAC: > 11.5cm (preferably at 12 cm, if MUAC used alone).
- » Follow patients for at least 6 months to ensure sustained growth.

MEDICINE TREATMENT

Do not repeat if child has received these during inpatient stay:

Give an additional dose of Vitamin A:

- Vitamin A (retinol), oral.

Age range	Dose Units	Capsule 100 000 IU	Capsule 200 000 IU
Infants 6–11 months	100 000	1 capsule	–
Children 12 months–5 years	200 000	2 capsules	1 capsule

- Multivitamin, oral, daily.

Empiric treatment for worms:

- Mebendazole, oral.
 - Children 1–2 years: 100 mg 12 hourly for 3 days.
 - Children > 2–5 years: 500 mg as a single dose.

OR

- Albendazole, oral, single dose.
 - Children 1–2 years: 200 mg as a single dose.
 - Children ≥ 2 years and adults: 400 mg as a single dose.

LoE:IIb⁷

REFERRAL

- » When regular nutritional supplements (e.g. RTUF) cannot be provided and follow-up on an ambulatory (outpatient) basis is not possible.
- » The child develops pitting oedema or any of the danger signs (see above).
- » Failure to gain weight despite provision of nutritional supplements.
- » Children showing developmental delay to be referred for rehabilitation.

LoE:IIIb⁸

3.2.2 MODERATE ACUTE MALNUTRITION (MAM)

E44.0

DESCRIPTION

Children and infants older than 6 months who have either:

- » A WHZ-score between -2 and -3.
- » MUAC between 11.5 cm and 12.5 cm.
- » No pitting oedema or SAM danger signs (see above).
- » Good appetite.

All cases require careful assessment for possible TB or HIV.

GENERAL MEASURES

- » Provide ready to use therapeutic food (RTUF) and/or other nutritional supplements according to supplementation guidelines.
- » Counsel according to IMCI guidelines.
- » Follow-up frequently to ensure that the child gains weight and remains well.
- » Discharge with supplementation, once the following criteria are met:
 - WHZ (weight-for-height z-score): > -2 WHZ for two consecutive visits at least one month apart and/or
 - MUAC: > 11.5 cm (preferably at 12 cm, if MUAC used alone).
- » Follow patients for at least 6 months to ensure sustained growth.

MEDICINE TREATMENT

Do not repeat if child has received these during inpatient stay:

Give an additional dose of Vitamin A:

- Vitamin A (retinol), oral.

Age range	Dose Units	Capsule 100 000 IU	Capsule 200 000 IU
Infants 6–11 months	100 000	1 capsule	–
Children 12 months–5 years	200 000	2 capsules	1 capsule

LoE:IVb⁹

- Multivitamin, oral, daily.

LoE:IVb¹⁰

Empiric treatment for worms:

- Mebendazole, oral.
 - Children 1–2 years: 100 mg 12 hourly for 3 days.
 - Children > 2–5 years: 500 mg as a single dose.

LoE:IVb¹¹**OR**

- Albendazole, oral, single dose.
 - Children 1–2 years: 200 mg as a single dose.
 - Children ≥ 2 years and adults: 400 mg as a single dose.

LoE:IIb¹²**REFERRAL**

- » No response to treatment.
- » All children other than those with insufficient food intake (If there is inadequate food intake, refer to a social worker, if available).
- » Severe malnutrition.
- » Children showing developmental delay to be referred for rehabilitation.

LoE:IIIb¹³**3.2.3 NOT GROWING WELL (INCLUDING FAILURE TO THRIVE/ GROWTH FALTERING)**

R62.0/R62.8/R62.9

DESCRIPTION

Children and infants who have either:

- » Unsatisfactory weight gain (growth curve flattening or weight loss) on the Road to Health chart/ booklet.

OR

- » Low weight for age (but WHZ > -2)

Note: Babies who were premature and are growing parallel to or better than the z-score line, should not be classified as having failure to thrive or not growing well.

Not growing well may be due to:

- » Insufficient food intake due to anorexia and illness or poor availability of food.
- » Insufficient uptake of nutrients, e.g. malabsorption.
- » Insufficient use of nutrients for growth due to chronic disease.
- » Increased demand for nutrients due to illness such as TB and HIV/ AIDS.

Conduct a feeding and clinical assessment to determine the cause. Exclude anaemia.

GENERAL MEASURES

- » Counselling on nutrition (see below).
- » Nutritional supplementation should be supplied unless there is a correctable cause.
- » Assess the general condition of the child.
- » Assess the child for possible HIV and TB, and manage appropriately.
- » Assess for other long-term health conditions, and manage appropriately.
- » Assess the child's feeding and recommend actions as outlined below.
- » Provide supplements according to child's age to meet specific nutritional needs.
- » Provide adequate micronutrients.
- » Ensure that immunisations are up to date. Record the dose given on the Road to Health chart/booklet.

- » Follow up monthly. If responding, review the child every two months.
- » Refer for social assistance if needed.

Feeding recommendations for all children:

0–6 months of age

Breastfeed exclusively- feed at least 8 times in 24 hours.

If formula is medically indicated (refer below) or if the mother has chosen to formula-feed the child, discuss safe preparation and use with the mother.

6–12 months of age

Continue breastfeeding (breastfeed before giving foods).

Introduce complementary foods at six months of age. Start by giving 2–3 teaspoons of iron-rich food such as mashed vegetables or cooked dried beans.

Children 6–8 months should be given two meals daily, gradually increasing the number of meals so that at 12 months the child is receiving 5 small meals.

For children who are not growing well, mix margarine, fat, or oil with their porridge.

12 months to 2 years of age

Continue breastfeeding. If the child is not breastfed, give 2 cups of full cream cow's milk every day. Make starchy foods the basis of the child's meal. Give locally available protein at least once a day, and fresh fruit or vegetables twice every day.

2–5 years of age

Give the child his/her own serving of family foods 3 times a day. In addition, give 2 nutritious snacks e.g. bread with peanut butter, full cream milk or fresh fruit between meals.

CONDITIONS WHICH JUSTIFY RECOMMENDING THAT MOTHERS DO NOT BREASTFEED

Infants with a small number of metabolic diseases qualify to receive specialised infant formula. These infants should be managed in tertiary centres.

Maternal medical condition that may justify temporary or permanent avoidance of breastfeeding:

- » Severe illness that prevents a mother from caring for her infant, e.g.: sepsis, renal failure.
- » Herpes simplex virus type 1 (HSV-1): direct contact between lesions on the mother's breasts and the infant's mouth should be avoided until all active lesions have resolved.
- » Maternal medications: sedating psychotherapeutic medicines, anti-epileptic medicines and opioids (may cause drowsiness and respiratory depression in the infant), radioactive iodine-131, excessive use of topical iodine or iodophors (especially on open wounds or mucous membranes), cytotoxic chemotherapy.

Infants who qualify to receive infant formula as part of the supplementation scheme:

- » The mother has died or infant has been abandoned.
- » Other individual circumstances deemed necessary by a multidisciplinary team.
- » Infants of mothers who are failing second or third line ARV treatment (VL >1000 copies/mL) should be advised not to breastfeed.

LoE:IVb¹⁴

MEDICINE TREATMENT

- Multivitamin, oral, daily.

Empiric treatment for worms (this will not treat tapeworm):

- Mebendazole, oral.
 - Children 1–2 years: 100 mg 12 hourly for 3 days.
 - Children > 2–5 years: 500 mg as a single dose.

OR

- Albendazole, oral, single dose.
 - Children 1–2 years: 200 mg as a single dose.
 - Children \geq 2 years and adults: 400 mg as a single dose.

LoE:IIb¹⁵

- Vitamin A (retinol), oral, 6 monthly.

Age range	Dose Units	Capsule 100 000 IU	Capsule 200 000 IU
Infants 6–11 months	100 000	1 capsule	–
Children 12 months–5 years	200 000	2 capsules	1 capsule

Anaemia:

See Section 3.1: Anaemia.

REFERRAL

- » No response to treatment.
- » All children other than those with insufficient food intake (If there is inadequate food intake, refer to a social worker, if available).
- » Severe malnutrition.

3.3 OVERWEIGHT AND OBESITY

E66.0/E66.8/E66.9

DESCRIPTION

Overweight and obesity are abnormal or excessive fat accumulation that may impair health.

Body mass index (BMI) is a simple index of weight-for-height that is commonly used to classify overweight and obesity in adults (> 19 years). It is defined as a person's weight in kilograms divided by the square of his height in meters (kg/m²).

For adults:

- » overweight is a BMI \geq 25 kg/m²; and
- » obesity is a BMI \geq 30 kg/m².

Children aged between 5–19 years:

- » overweight is BMI-for-age > 1 standard deviation above the WHO Growth Reference median; and
- » obesity is > 2 standard deviations above the WHO Growth Reference median.

For children < 5 years of age:

- » overweight is weight-for-height > 2 standard deviations above WHO Child Growth Standards median; and
- » obesity is weight-for-height > 3 standard deviations above the WHO Child Growth Standards median.

GENERAL MEASURES

- » maintain ideal weight, i.e. BMI \leq 25 kg/m²
- » weight reduction, i.e. if BMI $>$ 25 kg/m²
- » follow a prudent eating plan i.e. low fat, high fibre and unrefined carbohydrates, with fresh fruit and vegetables
- » regular moderate aerobic exercise, e.g. 30 minutes brisk walking 3–5 times/week (150 minutes/week)
- » screen for hypertension, diabetes and hyperlipidaemia, and manage appropriately (See Sections: 4.7: Hypertension, 9.2: Type 2 Diabetes mellitus, 4.1: Prevention of ischaemic heart disease and atherosclerosis).
- » calculate risk of developing cardiovascular events and manage appropriately (See Section: 4.1: Prevention of ischaemic heart disease and atherosclerosis).

REFERRAL

Dietician, physiotherapist and support group, where available and relevant.

LoE:IIb¹⁶

3.4 VITAMIN A DEFICIENCY

E50.0-9

DESCRIPTION

A condition predominantly affecting the skin, mucous membranes and the eyes.

It is most common in children of 1–5 years of age.

If associated with measles and diarrhoea there is an increased risk of illness and death.

If not identified and treated early, it can cause blindness.

Clinical features include:

- » night blindness or inability to see in the dark,
- » white foamy patches on the eye (Bitot's spot) or conjunctival and corneal dryness,
- » keratomalacia or wrinkling and cloudiness of cornea,
- » corneal ulceration or the cornea becomes soft and bulges.

GENERAL MEASURES

Increase dietary intake of vitamin A rich food including: fortified maize meal and/or bread; carrots, sweet potato, mangoes and pawpaw, broccoli, sprouts; dark green leafy vegetables e.g. morogo/imifino and spinach; apricots, melon, pumpkin, and liver, eggs, full cream milk and fish.

MEDICINE TREATMENT**Prophylaxis**

- Vitamin A (retinol), oral, every 6 months up to the age of 5 years.

Age range	Dose Units	Capsule 100 000 IU	Capsule 200 000 IU
Infants 6–11 months	100 000	1 capsule	–
Children 12 months–5 years	200 000	2 capsules	1 capsule

Children with the following conditions should be given an additional dose:

- » Severe Acute Malnutrition.
- » Persistent diarrhoea.
- » Measles.

- Vitamin A (retinol), oral.

Age range	Dose Units	Capsule 100 000 IU	Capsule 200 000 IU
Infant < 6 months	50 000	½ capsule	–
Infants 6–11 months	100 000	1 capsule	–
Children 12 months–5 years	200 000	2 capsules	1 capsule

Administration of a vitamin A capsule

- Cut the narrow end of the capsule with scissors.
- Open the child's mouth by gently squeezing the cheeks.
- Squeeze the drops from the capsule directly into the back of the child's mouth. If a child spits up most of the vitamin A liquid immediately, give one more dose.
- Do **NOT** give the capsule to the mother or the caretaker to take home.

Treatment

If any clinical eye signs of vitamin A deficiency are present (see clinical features above), give a pre-referral dose:

- Vitamin A (retinol), oral, as a pre-referral dose.

Age range	Dose Units (IU)	Capsule 100 000 IU	Capsule 200 000 IU
Infant < 6 months	50 000	½ capsule	–
Infants 6–11 months	100 000	1 capsule	–
Children > 12 months and adults	200 000	2 capsules	1 capsule

Note:

- » Children (6 months to 5 years of age) who received a routine prophylactic dose within the previous month should not receive any additional doses of vitamin A.
- » If a child is scheduled to receive a routine prophylactic dose of vitamin A and has received a treatment dose within the past month, postpone the routine dose for approximately one month.
- » Wait at least one month between doses.
- » Children receiving routine multivitamin syrup can still receive vitamin A supplements.

REFERRAL

All cases with clinical signs.

3.5 VITAMIN B DEFICIENCIES

3.5.1 VITAMIN B₃/NICOTINIC ACID DEFICIENCY (PELLAGRA)

E52

DESCRIPTION

Pellagra is a condition associated with nicotinic acid deficiency. It is usually accompanied by other vitamin deficiencies.

Clinical features include:

- » diarrhoea
- » dementia
- » dermatitis with darkening of sun-exposed skin

GENERAL MEASURES

- » Lifestyle adjustment including discouraging of alcohol abuse.
- » Dietary advice. Increase intake of liver, kidneys, other meats, poultry and fish, milk, marmite and Brewer's yeast, peanuts, pulses, whole meal wheat and bran.

MEDICINE TREATMENT**For severe deficiency**Children

- Nicotinamide, oral, 50 mg 8 hourly until resolution of major signs and symptoms.

Adults

- Nicotinamide, oral, 100 mg 8 hourly until skin lesions heal

LoE:IVb¹⁷**For mild deficiency**Children

- Nicotinamide, oral, 50 mg daily for one week.

Adults

- Nicotinamide, oral, 100 mg daily for one week.

REFERRAL

Failure to respond.

3.5.2 VITAMIN B₆/PYRIDOXINE DEFICIENCY

E53.1

DESCRIPTION

Commonly presents as signs of peripheral neuropathy including:

- » tingling sensation
- » burning pain or numbness of the feet

Pyridoxine deficiency is related to:

- » malnutrition
- » alcoholism
- » isoniazid or combination TB therapy

GENERAL MEASURES

Dietary advice: Increase intake of pyridoxine rich foods such as:

- » Liver, meat, fish and offal,
- » Wholegrain cereals, fortified breakfast cereals,
- » Peanuts, bananas, raw vegetables,
- » Walnuts and seeds, avocados, dried fruits,
- » Potatoes and baked beans.

MEDICINE TREATMENT**For deficiency**Children

- Pyridoxine, oral, 12.5 mg daily for 3 weeks.

Adults

- Pyridoxine, oral, 25 mg daily for 3 weeks.

For medicine-induced neuropathyChildren

- Pyridoxine, oral, daily for 6 months.
 - < 5 years of age: 12.5 mg daily.
 - ≥ 5 years of age: 25 mg daily.

LoE:IVb ¹⁸

Adults

- Pyridoxine, oral, 200 mg daily for 3 weeks.

Then follow with:

- Pyridoxine, oral, 25 mg daily as maintenance dose (for patients on TB therapy/isoniazid).

REFERRAL

Failure to respond.

Children.

3.5.3 VITAMIN B₁/THIAMINE DEFICIENCY (WERNICKE ENCEPHALOPATHY AND BERIBERI)

E51.1-2/E51.8-9

DESCRIPTION

Clinical features include:

- » confusion
- » short-term memory loss
- » paralysis of one or more of the ocular muscles or ophthalmoplegia
- » nystagmus
- » ataxia
- » peripheral neuropathy
- » cardiac failure

Alcoholics may present with Wernicke encephalopathy, neuropathies or cardiac failure associated with multiple vitamin deficiencies.

GENERAL MEASURES

- » Lifestyle adjustment including discouraging alcohol abuse.
- » Dietary advice to increase intake of thiamine rich foods such as: wholewheat breads, oatmeal, pulses, nuts, yeast, fortified cereals, pork, bacon, marmite and potatoes and peas.

MEDICINE TREATMENT

Peripheral neuropathy and cardiac failure

- Thiamine, oral, 100 mg daily.

In susceptible patients, administration of intravenous glucose precipitates Wernicke encephalopathy if administered before thiamine supplementation. Thiamine should be given first in all patients treated with intravenous glucose who are at risk of thiamine deficiency, e.g. alcoholics.

REFERRAL

All patients with encephalopathy, eye muscle paralysis or cardiac failure.

References:

- Albendazole, oral: Steinmann P, Utzinger J, Du ZW, Jiang JY, Chen JX, Hattendorf J, Zhou H, Zhou XN. Efficacy of single-dose and triple-dose albendazole and mebendazole against soil-transmitted helminths and *Taenia* spp.: a randomized controlled trial. *PLoSOne*. 2011;16(9):e25003. <https://www.ncbi.nlm.nih.gov/pubmed/21980373>
- Albendazole, oral: Mabaso ML, Appleton CC, Hughes JC, Gouws E. Hookworm (*Necator americanus*) transmission in inland areas of sandy soils in KwaZulu-Natal, South Africa. *Trop Med Int Health*. 2004 Apr;9(4):471-6. <https://www.ncbi.nlm.nih.gov/pubmed/15078265>
- Albendazole, oral: Montresor A, Awasthi S, Crompton DW. Use of benzimidazoles in children younger than 24 months for the treatment of soil-transmitted helminthiasis. *Acta Trop*. 2003 May;86(2-3):223-32. <https://www.ncbi.nlm.nih.gov/pubmed/12745139>
- Albendazole, oral: American Academy of Pediatrics. In: Pickering LK, Baker CJ, Kimberlin DW, Long SS, eds. *Red Book: 2012 Report of the Committee on Infectious Diseases*. Elk Grove Village, IL: American Academy of Pediatrics; 2012:241. https://redbook.solutions.aap.org/DocumentLibrary/RB12_interior.pdf
- Albendazole, oral: National Department of Health: Affordable Medicines, EDP-PHC. Medicine Review: Benzimidazoles for soil-transmitted helminths, 31 Jan 2017. <https://www.knowledgehub.org.za/content/standard-treatment-guidelines-and-essential-medicines-list>
- Ferrous sulfate/fumarate, oral: South African Medicines Formulary, 14th Edition. Division of Clinical Pharmacology. University of Cape Town, 2022.
- Ferrous sulfate/fumarate, oral: Reveiz L, Gyte GM, Cuervo LG, Casasbuenas A. Treatments for iron-deficiency anaemia in pregnancy. *Cochrane Database Syst Rev*. 2011 Oct 5;(10):CD003094. <https://www.ncbi.nlm.nih.gov/pubmed/21975735>
- Ferrous sulfate/fumarate, oral: Rimón E, Kagansky N, Kagansky M, Mechnick L, Mashiah T, Namir M, Levy S. Are we giving too much iron? Low-dose iron therapy is effective in octogenarians. *Am J Med*. 2005 Oct;118(10):1142-7. <https://www.ncbi.nlm.nih.gov/pubmed/16194646>
- Ferrous sulfate/fumarate, oral (duration of therapy): Alleyne M, Home MK, Miller JL. Individualized treatment for iron-deficiency anemia in adults. *Am J Med*. 2008 Nov;121(11):943-8. <http://www.ncbi.nlm.nih.gov/pubmed/18954837>
- Intermittent iron supplementation: Moretti D, Goede JS, Zeder C, et al. Oral iron supplements increase hepcidin and decrease iron absorption from daily or twice-daily doses in iron-depleted young women. *Blood*. 2015 Oct 22;126(17):1981-9. <https://www.ncbi.nlm.nih.gov/pubmed/26289639>
- Intermittent iron supplementation: Stoffel NU, Cercamondi CI, Brittenham G, et al. Iron absorption from oral iron supplements given on consecutive versus alternate days and as single morning doses versus twice-daily split dosing in iron-depleted women: two open-label, randomised controlled trials. *Lancet Haematol*. 2017 Nov;4(11):e524-e533. <https://www.ncbi.nlm.nih.gov/pubmed/29032957>
- Intermittent iron supplementation: Pena-Rosas JP, De-Regil LM, Gomez Malave H, Flores-Urrutia MC, Dowswell T. Intermittent oral iron supplementation during pregnancy. The Cochrane database of systematic reviews. 2015(10):CD009997. <https://www.ncbi.nlm.nih.gov/pubmed/26482110>
- Intermittent iron supplementation: Rimón E, Kagansky N, Kagansky M, Mechnick L, Mashiah T, Namir M, Levy S. Are we giving too much iron? Low-dose iron therapy is effective in octogenarians. *Am J Med*. 2005 Oct;118(10):1142-7. <https://www.ncbi.nlm.nih.gov/pubmed/16194646>
- Intermittent iron supplementation: National Department of Health, Essential Drugs Programme: Adult Hospital Level STGs and EML, 2019. <https://www.knowledgehub.org.za/content/standard-treatment-guidelines-and-essential-medicines-list>
- Iron treatment – causes for failure to respond: National Department of Health, Essential Drugs Programme: Adult Hospital Level STGs and EML, 2019. <https://www.knowledgehub.org.za/content/standard-treatment-guidelines-and-essential-medicines-list>
- Iron prophylaxis - preterm infants: National Department of Health, Essential Drugs Programme: Paediatric Hospital Level STGs and EML, 2020 (draft format).
- Iron prophylaxis - preterm infants: Baker RD, Greer FR; Committee on Nutrition American Academy of Pediatrics. Diagnosis and prevention of iron deficiency and iron-deficiency anemia in infants and young children (0-3 years of age). *Pediatrics*. 2010 Nov;126(5):1040-50. <https://www.ncbi.nlm.nih.gov/pubmed/20923825>
- Iron preparations: National Department of Health, Essential Drugs Programme: Paediatric Hospital Level STGs and EML, 2020 (draft format).
- Iron preparations: South African Medicines Formulary, 14th Edition. Division of Clinical Pharmacology. University of Cape Town, 2022.

- ⁷ Albendazole, oral: Steinmann P, Utzinger J, Du ZW, Jiang JY, Chen JX, Hattendorf J, Zhou H, Zhou XN. Efficacy of single-dose and triple-dose albendazole and mebendazole against soil-transmitted helminths and *Taenia* spp.: a randomized controlled trial. *PLoS One*. 2011;16(9):e25003. <https://www.ncbi.nlm.nih.gov/pubmed/21980373>
- Albendazole, oral: Mabaso ML, Appleton CC, Hughes JC, Gouws E. Hookworm (*Necator americanus*) transmission in inland areas of sandy soils in KwaZulu-Natal, South Africa. *Trop Med Int Health*. 2004 Apr;9(4):471-6. <https://www.ncbi.nlm.nih.gov/pubmed/15078265>
- Albendazole, oral: Montresor A, Awasthi S, Crompton DW. Use of benzimidazoles in children younger than 24 months for the treatment of soil-transmitted helminthiasis. *Acta Trop*. 2003 May;86(2-3):223-32. <https://www.ncbi.nlm.nih.gov/pubmed/12745139>
- Albendazole, oral: American Academy of Pediatrics. In: Pickering LK, Baker CJ, Kimberlin DW, Long SS, eds. *Red Book: 2012 Report of the Committee on Infectious Diseases*. Elk Grove Village, IL: American Academy of Pediatrics; 2012:241. https://redbook.solutions.aap.org/DocumentLibrary/RB12_interior.pdf
- Albendazole, oral: National Department of Health: Affordable Medicines, EDP-PHC. Medicine Review: Benzimidazoles for soil-transmitted helminths, 31 Jan 2017. <https://www.knowledgehub.org.za/content/standard-treatment-guidelines-and-essential-medicines-list>
- ⁸ Rehabilitation referral (malnourished – developmental delay): Hume-Nixon M, Kuper H. The association between malnutrition and childhood disability in low- and middle- income countries: systematic review and meta-analysis of observational studies. *Trop Med Int Health*. 2018 Nov;23(11):1158-1175. <https://pubmed.ncbi.nlm.nih.gov/30151939/>
- Rehabilitation referral (malnourished – developmental delay): Hwang AV, Chao MY, Liu SW. A randomized controlled trial of routines-based early intervention for children with or at risk for developmental delay. *Res Dev Disabil*. 2013 Oct;34(10):3112-23. <https://pubmed.ncbi.nlm.nih.gov/23886756/>
- ⁹ Vitamin A, oral (MAM): National Department of Health. Integrated management of children with acute malnutrition in South Africa: Operational Guidelines, 2015. <http://www.health.gov.za/>
- ¹⁰ Multivitamin, oral (MAM): National Department of Health. Integrated management of children with acute malnutrition in South Africa: Operational Guidelines, 2015. <http://www.health.gov.za/>
- ¹¹ Mebendazole, oral (MAM): National Department of Health. Integrated management of children with acute malnutrition in South Africa: Operational Guidelines, 2015. <http://www.health.gov.za/>
- ¹² Albendazole, oral: Steinmann P, Utzinger J, Du ZW, Jiang JY, Chen JX, Hattendorf J, Zhou H, Zhou XN. Efficacy of single-dose and triple-dose albendazole and mebendazole against soil-transmitted helminths and *Taenia* spp.: a randomized controlled trial. *PLoS One*. 2011;16(9):e25003. <https://www.ncbi.nlm.nih.gov/pubmed/21980373>
- Albendazole, oral: Mabaso ML, Appleton CC, Hughes JC, Gouws E. Hookworm (*Necator americanus*) transmission in inland areas of sandy soils in KwaZulu-Natal, South Africa. *Trop Med Int Health*. 2004 Apr;9(4):471-6. <https://www.ncbi.nlm.nih.gov/pubmed/15078265>
- Albendazole, oral: Montresor A, Awasthi S, Crompton DW. Use of benzimidazoles in children younger than 24 months for the treatment of soil-transmitted helminthiasis. *Acta Trop*. 2003 May;86(2-3):223-32. <https://www.ncbi.nlm.nih.gov/pubmed/12745139>
- Albendazole, oral: American Academy of Pediatrics. In: Pickering LK, Baker CJ, Kimberlin DW, Long SS, eds. *Red Book: 2012 Report of the Committee on Infectious Diseases*. Elk Grove Village, IL: American Academy of Pediatrics; 2012:241. https://redbook.solutions.aap.org/DocumentLibrary/RB12_interior.pdf
- Albendazole, oral: National Department of Health: Affordable Medicines, EDP-PHC. Medicine Review: Benzimidazoles for soil-transmitted helminths, 31 Jan 2017. <https://www.knowledgehub.org.za/content/standard-treatment-guidelines-and-essential-medicines-list>
- ¹³ Rehabilitation referral (malnourished – developmental delay): Hume-Nixon M, Kuper H. The association between malnutrition and childhood disability in low- and middle- income countries: systematic review and meta-analysis of observational studies. *Trop Med Int Health*. 2018 Nov;23(11):1158-1175. <https://pubmed.ncbi.nlm.nih.gov/30151939/>
- Rehabilitation referral (malnourished – developmental delay): Hwang AV, Chao MY, Liu SW. A randomized controlled trial of routines-based early intervention for children with or at risk for developmental delay. *Res Dev Disabil*. 2013 Oct;34(10):3112-23. <https://pubmed.ncbi.nlm.nih.gov/23886756/>
- ¹⁴ Supplementary infant feeding (Mothers failing 2nd or 3rd line ART): National Department of Health, Essential Drugs Programme: Paediatric Hospital Level STGs and EML, 2020 (draft format).
- ¹⁵ Albendazole, oral: Steinmann P, Utzinger J, Du ZW, Jiang JY, Chen JX, Hattendorf J, Zhou H, Zhou XN. Efficacy of single-dose and triple-dose albendazole and mebendazole against soil-transmitted helminths and *Taenia* spp.: a randomized controlled trial. *PLoS One*. 2011;16(9):e25003. <https://www.ncbi.nlm.nih.gov/pubmed/21980373>
- Albendazole, oral: Mabaso ML, Appleton CC, Hughes JC, Gouws E. Hookworm (*Necator americanus*) transmission in inland areas of sandy soils in KwaZulu-Natal, South Africa. *Trop Med Int Health*. 2004 Apr;9(4):471-6. <https://www.ncbi.nlm.nih.gov/pubmed/15078265>
- Albendazole, oral: Montresor A, Awasthi S, Crompton DW. Use of benzimidazoles in children younger than 24 months for the treatment of soil-transmitted helminthiasis. *Acta Trop*. 2003 May;86(2-3):223-32. <https://www.ncbi.nlm.nih.gov/pubmed/12745139>
- Albendazole, oral: American Academy of Pediatrics. In: Pickering LK, Baker CJ, Kimberlin DW, Long SS, eds. *Red Book: 2012 Report of the Committee on Infectious Diseases*. Elk Grove Village, IL: American Academy of Pediatrics; 2012:241. https://redbook.solutions.aap.org/DocumentLibrary/RB12_interior.pdf
- Albendazole, oral: National Department of Health: Affordable Medicines, EDP-PHC. Medicine Review: Benzimidazoles for soil-transmitted helminths, 31 Jan 2017. <https://www.knowledgehub.org.za/content/standard-treatment-guidelines-and-essential-medicines-list>
- ¹⁶ Rehabilitation referral (diet and exercise – obese children): Brown T, Moore TH, Hooper L, Gao Y, Zayegh A, Ijaz S, Elwenspoek M, Foxen SC, Magee L, O'Malley C, Waters E, Summerbell CD. Interventions for preventing obesity in children. *Cochrane Database Syst Rev*. 2019 Jul 23;7(7):CD001871. <https://pubmed.ncbi.nlm.nih.gov/31332776/>
- ¹⁷ Nicotinamide, oral (duration of therapy): South African Medicines Formulary, 14th Edition. Division of Clinical Pharmacology. University of Cape Town, 2022.
- ¹⁸ Pyridoxine, oral (children – medicine induced neuropathy): National Department of Health, Essential Drugs Programme: Paediatric Hospital Level STGs and EML, 2020 (draft format).

**SOUTH AFRICAN PRIMARY HEALTHCARE ESSENTIAL MEDICINES LIST
& STANDARD TREATMENT GUIDELINES
CHAPTER 3: NUTRITION & ANAEMIA
NEMLC RECOMMENDATIONS FOR MEDICINE AMENDMENTS (2020-2023 REVIEW CYCLE)**

Recommendations, with supporting evidence and rationale are listed below.
Kindly review the amendments in the context of the respective standard treatment guidelines (STGs).

A: AMENDMENTS

SECTION	MEDICINE/MANAGEMENT	ADDED/DELETED/AMENDED
3.2.1.2 Uncomplicated SAM and 3.2 Moderate acute malnutrition (MAM)	Referral criteria	Amended to include referral for rehabilitation
3.3 Obesity and overweight	Referral criteria	Amended to include referral for rehabilitation
3.5.3 Vitamin B1/thiamine deficiency (Wernicke encephalopathy and Beriberi)	Referral criteria	Not amended to include referral for rehabilitation

Note: Amendments to the chapter are limited to referral criteria for rehabilitation. This chapter was not prioritised for review for the 2020-23 review cycle and the contents of the chapter has not been reviewed in its entirety.

3.2.1.2 UNCOMPLICATED SAM and 3.2.2 MODERATE ACUTE MALNUTRITION (MAM)

Referral criteria: *amended to include referral for rehabilitation*

Guidance has been added to refer malnourished children to rehabilitation for screening of developmental delay and appropriate family centred management to improve functional outcomes based on low certainty benefit that suggests that routine-based early intervention may improve development.^{1 2}

The following referral criterion was added to the respective STGs:

» Children showing developmental delay to be referred for rehabilitation.

3.3 OBESITY AND OVERWEIGHT

Referral criteria: *amended to include referral for rehabilitation*

Guidance has been added to the STG to refer children with severe obesity presenting with painful hips or limping gait for rehabilitation to improve physical function and pain. Children with obesity or who are overweight should be referred for rehabilitation for weight loss management. Children with obesity should be referred to physiotherapists and dietitians for a weight loss diet combined with a physical activity plan, based on a systematic review of moderate certainty evidence that suggests that dietary interventions combined with physical activity interventions may decrease body mass index.³

The referral criteria were amended as follows:

» Dietician, physiotherapist and support group, where available and relevant.

¹ Hume-Nixon M, Kuper H. The association between malnutrition and childhood disability in low- and middle- income countries: systematic review and meta-analysis of observational studies. Trop Med Int Health. 2018 Nov;23(11):1158-1175.

² Hwang AW, Chao MY, Liu SW. A randomized controlled trial of routines-based early intervention for children with or at risk for developmental delay. Res Dev Disabil. 2013 Oct;34(10):3112-23.

³ Brown T, Moore TH, Hooper L, Gao Y, Zayegh A, Ijaz S, Elwenspoek M, Foxen SC, et al. Interventions for preventing obesity in children. Cochrane Database Syst Rev. 2019 Jul 23;7(7):CD001871.

3.5.3 VITAMIN B1/THIAMINE DEFICIENCY (WERNICKE ENCEPHALOPATHY AND BERIBERI)

Referral criteria: *not amended to include referral for rehabilitation*

The motivation to include guidance in this STG to refer patients with Wernicke's encephalopathy with mobility impairments for rehabilitation to improve gait and balance and to refer patients with Vitamin B deficiency showing signs of memory loss and/or confusion to rehabilitation to improve memory and self-care was not accepted as the motivation was based on a systematic review of low certainty evidence⁴ and a case report.⁵ The PHC STG recommends that all suspected cases be referred with pre-referral dose of thiamine, oral. Diagnosis confirmation and management would happen at secondary level of care, where referral to rehabilitation services can be decided.

⁴ Mills RJ, Yap L, Young CA. Treatment for ataxia in multiple sclerosis. Cochrane Database Syst Rev. 2007 Jan 24;(1):CD005029.

⁵ Genç A, Özdemir EC, Moustafa, E, Küçükdeveci AA. Is physical rehabilitation effective for Wernicke–Korsakoff syndrome? A case report, International Journal of Rehabilitation Research: December 2018;41(4):373-376.