



Anaemia Pathway

Background

- Point prevalence of anaemia is high in India
- [NFHS5 data](#):
 - o 57.2% of women aged 15-49 anaemic (Hb < 12)
 - 54.1% urban, 58.7% rural
 - o 25% of men aged 15-49 anaemic (Hb < 13)
 - 20.4% urban, 27.4% rural
- National Nutritional Anaemia Prevention Programme □ free iron and folic acid supplementation for children, expectant/nursing mothers, women who attend family planning services
 - o Has not been successful
- 2013 □ National Iron Plus Initiative □ free iron and folic acid for children/adolescents aged 10-19
- Other programs in the past
 - o Integrated Child Development Services
 - o National Nutrition Policy
 - o National Programme for Nutritional Support to Primary Education (Mid-day Meal Programme)
 - o 12 x 12 Initiative
 - o Rajiv Gandhi Scheme for Girls Empowerment of Adolescent, SABLA
 - o National Rural Health Mission
- Currently □ Anemia Mukh Bharat
- Despite multiple national programs targeting anaemia, overall rates of anaemia have not decreased (per serial NFHS')

Drivers of anaemia in India

- Inadequate dietary intake (vegetarian diet)
- Loss of iron during menstrual cycle
- Repeated pregnancy/lactation
- Infections

Barriers to improving anaemia

- Inadequate supplies/coverage of programs
- Education
- Compliance

Relevant documents

- [National Rural Health Mission Guidelines for Control of IDA](#)
- [Anemia Mukh Bharat Intensified National Iron Plus Initiative](#)

Causes of anaemia (with an emphasis on LMICs)

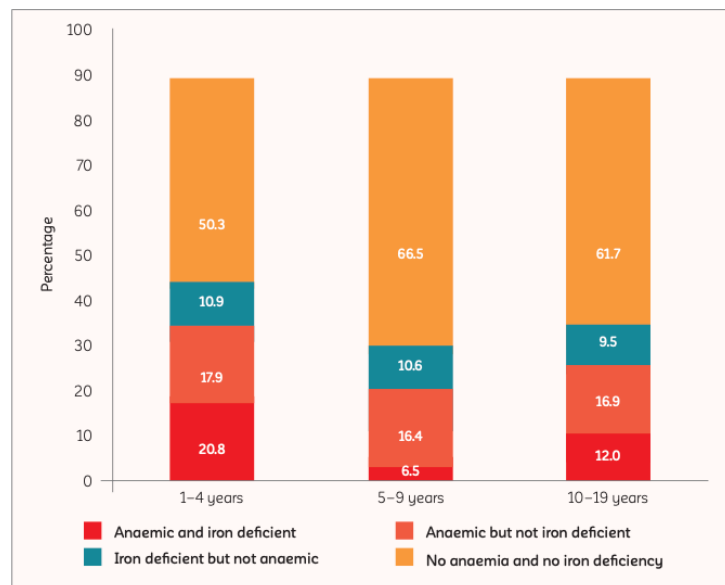
- Decreased production

- Iron deficiency
- Other nutritional deficiencies (folic acid, B12, A)
- Depressed bone marrow function
- Infectious (HIV, leishmania)
- Renal failure
- Loss of RBCs
 - Acute or chronic haemorrhage
- Increased destruction (haemolysis)
 - Infections (malaria, HIV)
 - Haemoglobinopathy (sickle cell, thalassemia)
 - Drug reaction (e.g. G6PD deficiency)

Iron-deficiency anaemia (IDA) vs non-iron deficiency anaemia (NIDA)

- It is likely that the vast majority of anaemia in India is IDA
- In a [2007 study](#) of 100 non-pregnant, non-lactating women in Bangalore, 95% of anaemic women were iron deficient
- In a [2022 study](#) of 258 mothers (pregnant or post-natal), 65.9% were anaemic. Of women with anaemia, 61.8% had normal ferritin levels
 - However, risk of confounding here – given the patient population should have been commenced on iron supplementation at time of pregnancy
- The [Comprehensive National Nutrition Survey \(CNNS\)](#) provides more data, but only sampled patients aged between 0-19
 - In the survey, 12% of children aged 10-19 were anaemic and iron deficient and 16.9% of the same group were anaemic but NOT iron deficient

Figure 6.6: Prevalence of anaemia and iron deficiency among children and adolescents, India, CNNS 2016–18





Anaemia Sequence

Is the patient stable/actively bleeding

- If there is active bleeding, achieve haemostasis. Refer for blood transfusion and further management

Consider anaemia patterns based on clinical presentation

- Diet/nutritional deficiency
- Acute blood loss
- Personal or family history of anaemia
 - o Suggests hereditary/genetic syndrome
- Menstrual history
- Alcohol intake
- Renal disease
- Underlying illness
- Malaria
- Helminth infection
- Thalassemia
- Sickle cell disease

Initial test (first line)

- Hemo-cue (POC Hb)
- Is Hb < 8 (severe anaemia)?
 - o **Transfusion based on local protocol**
- Is CBC available?
 - o If yes, perform CBC (Hb and MCV inform further assessment)
 - o If no, treat empirically for most likely cause based on age, demographics, local epidemiology, clues from history

What is the MCV?

- MCV < 80 fL
 - o Common causes: iron deficiency, thalassemia, anaemia of chronic disease
- MCV 80-100 fL
 - o Iron deficiency
 - o B12 or folate deficiency
 - o Anaemia of chronic disease
 - o Drug-induced
 - o Infection
 - o Liver disease/alcohol
 - o Haemolysis
 - o Hypothyroid
 - o Other



- MCV > 100 fL
 - B12 or folate deficiency
 - Drug-induced
 - Liver disease/alcohol use
 - High reticulocyte count
 - MDS
 - Other

If MCV < 80

- Is ferritin testing or transferrin saturation available?
- If ferritin < 30 ng/mL, **treat as iron deficiency**
- If ferritin > 30 ng/mL, then check transferrin saturation
 - If TSAT < 20%, then treat as IDA
 - If TSAT > 20%, then IDA unlikely
 - Consider anaemia of chronic disease or thalassemia
 - If MCV is low out of proportion to Hb, suspect thalassemia
- If ferritin/TSAT not available:
 - Empirically treat for iron deficiency anaemia
 - (same treatment as below)
- If IDA:
 - Commence iron replacement
 - PO iron for mild anaemia, IV iron for moderate-severe anaemia
 - Indian government offers combined iron-folic acid pills containing 100mg elemental iron and 500mcg of folic acid
 - Consider need for blood transfusion if life-threatening anaemia – this will require transfer to the closest district hospital
 - PO Albendazole 400mg once on an empty stomach
 - Re-check Hb in 1 month for response
 - If Hb improved, continue iron replacement
 - 3-6 months of therapy are required for replenish iron stores
 - If not improved after 1 month: re-consider diagnosis (see pathway)
 - Address underlying cause
 - Parasites? (deworming), menstrual bleeding, peptic ulcer, GI malignancy, etc.
- If thalassemia suspected
 - Suspect if MCV out of proportion to the degree of anaemia
 - Refer for electrophoresis and further management
 - If patient has suspected thalassemia and is also iron deficient, iron deficiency should still be treated (with PO or IV iron)
- If sickle cell suspected
 - Consider if severe anaemia or family history
 - POC screening test for sickle cell (HemotypeSC is one POC test)
 - Confirmatory test – send to lab (HPLC)
- Anaemia of chronic disease



If MCV > 100

- Send B12 and folate levels if available
 - o If low, then replace
 - o B12:
 - Give 1000mcg vitamin B12 IM once
 - Then give 1000 mcg vitamin B12 PO daily
 - o Folate
 - Give 1-5g folic acid PO daily
- If B12 and folate normal, consider TSH, alcohol use, serum copper, peripheral blood smear, liver function
- If no testing, treat empirically for B12 and folate deficiency
 - o B12:
 - Give 1000mcg vitamin B12 IM once
 - Then give 1000 mcg vitamin B12 PO daily
 - o Folate
 - Give 1-5g folic acid PO daily
- Re-check Hb and MCV in 1 month for response to treatment
- If no response Perform further assessment. May require additional diagnostic testing or referral

If MCV 80-100

- Normocytic anaemia
- Causes:
 - o Nutritional deficiency (iron, B12, folate deficiency)
 - o Anaemia of chronic disease
 - o Chronic kidney disease
 - o Heart failure
 - o Hypothyroidism
 - o Endocrine
 - o Cancer
 - o Stem cell disorder
 - o Early blood loss
 - o Partially treated anaemia
- Is there access to iron studies/further testing?
 - o If no, consider concurrent iron/b12/folate therapy
- Perform iron studies (ferritin and transferrin saturation)
 - o If iron deficiency treat
 - o Re-check after 1 month
- If iron stores normal
 - o Consider nutritional causes
 - o Consider haemolysis
 - o Consider therapy with B12 and folate
 - o Consider underlying illness/anaemia of chronic disease

How to give IV iron



- Is there local capacity to give IV iron infusion
 - If no, then refer to district hospital/closest centre with capacity
 - If yes, then which preparation?
 - IV iron sucrose (most common)
 - Give 200mg in 100ml normal saline IV over 30 minutes daily until desired dose is reached
 - Use [Ganzoni equation](#) for iron deficiency anaemia
 - Total iron deficit, mg = weight, kg x (target hemoglobin, g/dL – actual hemoglobin, g/dL) x 2.4 + iron stores, mg
 - Iron Carboxymaltose (more expensive)
 - 1gm in 100ml normal saline IV over 30 minutes

If Malaria

- See CSA malaria pathway (to be developed with the other fever content)
- Leads to anaemia through destruction of RBCs, and decreased RBC production
- Diagnose and treat as per [National Malaria Guidelines](#)
- Diagnosis
 - Microscopy (thick and thin smear) or rapid diagnostic test
- Treatment
 - *P. vivax*: chloroquine or primaquine
 - *P. falciparum*: Artemisinin combination therapy