Anaemia Pathway

Background

- Point prevalence of anaemia is high in India
- NFHS5 data:
  - 57.2% of women aged 15-49 anaemic (Hb < 12)
    - 54.1% urban, 58.7% rural
  - 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
  - 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
  - Integrated Child Development Services
  - National Nutrition Policy
  - National Programme for Nutritional Support to Primary Education (Mid-day Meal Programme)
  - 12 x 12 Initiative
  - Rajiv Gandhi Scheme for Girls Empowerment of Adolescent, SABLA
  - National Rural Health Mission
- Currently Anemia Mukt 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 Mukt Bharat Intensified National Iron Plus Initiative

Causes of anaemia (with an emphasis on LMICs)

- Decreased production

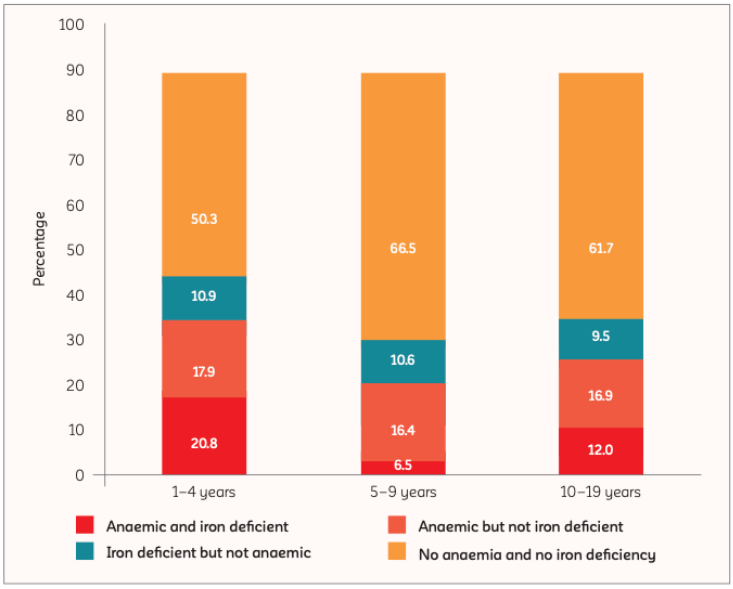
- Iron deficiency
- Other nutritional deficiencies (folic acid, B12, A)
- Depressed bone marrow function
- Infectious (HIV, leishmania)
- Renal failure

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

What is the MCV?

- MCV < 80 fL
    - Common causes: iron deficiency, thalassemia, anaemia of chronic disease
- MCV 80-100 fL
    - Iron deficiency
    - B12 or folate deficiency
    - Anaemia of chronic disease
    - Drug-induced
    - Infection
    - Liver disease/alcochol
    - Haemolysis
    - Hypothyroid
    - 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
    - If low, then replace
    - B12:
        - Give 1000mcg vitamin B12 IM once
        - Then give 1000 mcg vitamin B12 PO daily
    - 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
    - B12:
        - Give 1000mcg vitamin B12 IM once
        - Then give 1000 mcg vitamin B12 PO daily
    - 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:
    - Nutritional deficiency (iron, B12, folate deficiency)
    - Anaemia of chronic disease
    - Chronic kidney disease
    - Heart failure
    - Hypothyroidism
    - Endocrine
    - Cancer
    - Stem cell disorder
    - Early blood loss
    - Partially treated anaemia
- Is there access to iron studies/further testing?
    - If no, consider concurrent iron/b12/folate therapy
- Perform iron studies (ferritin and transferrin saturation)
    - If iron deficiency treat
    - Re-check after 1 month
- If iron stores normal
    - Consider nutritional causes
    - Consider haemolysis
    - Consider therapy with B12 and folate
    - 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